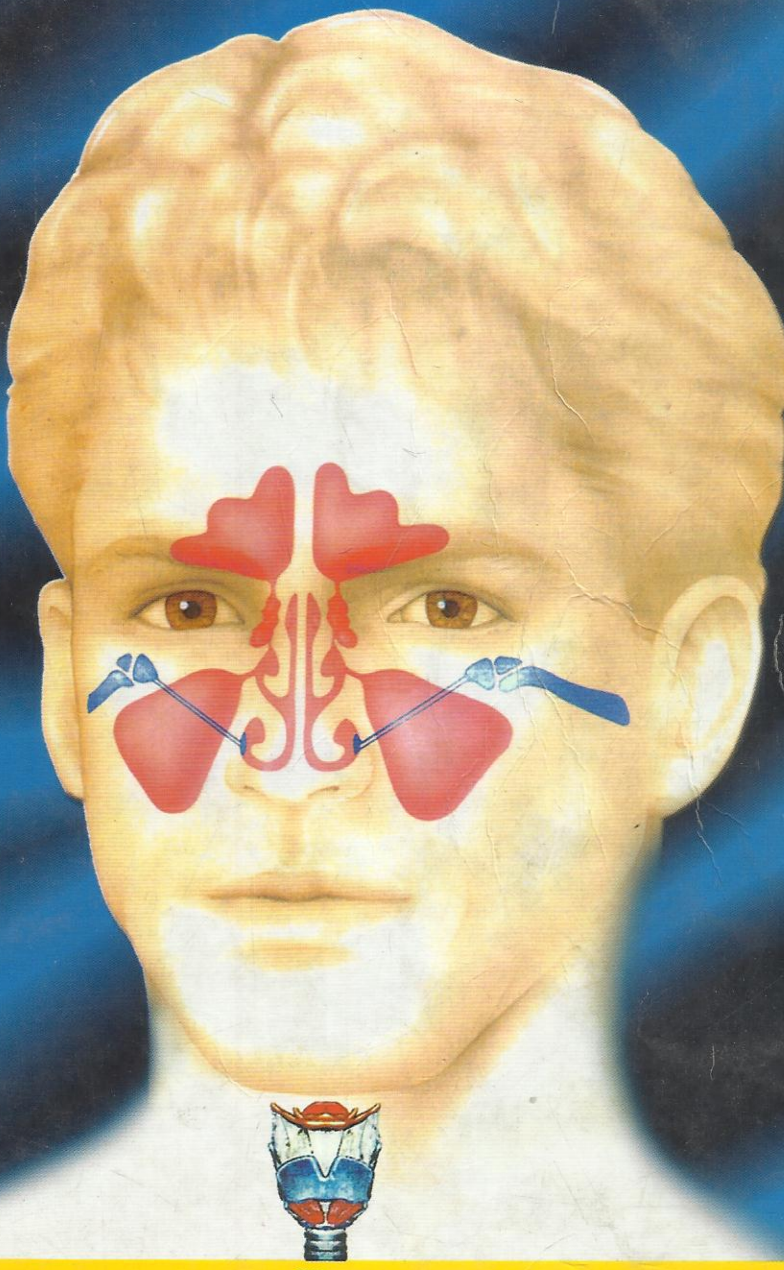
Introduction to E.N.T.



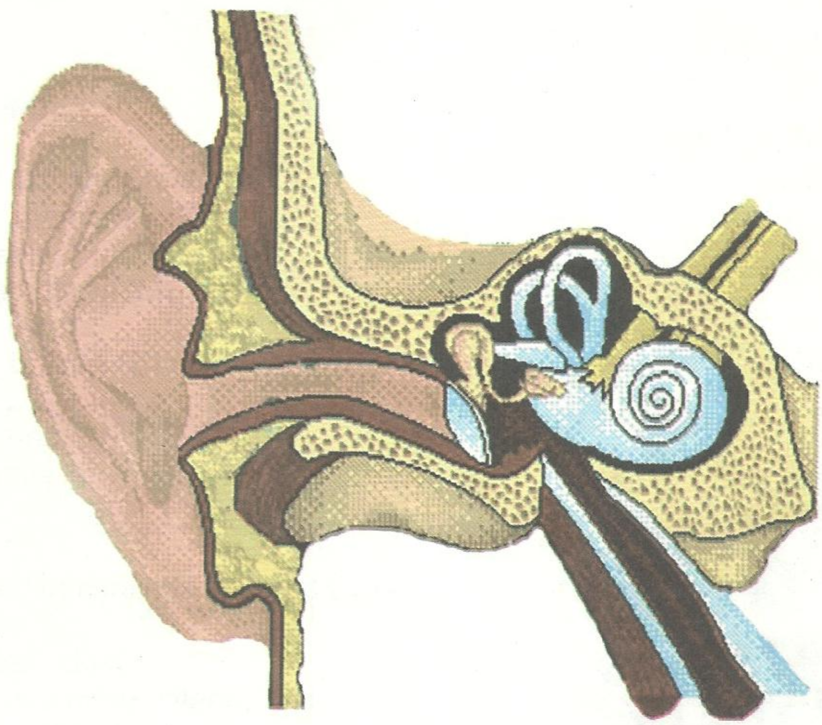
By

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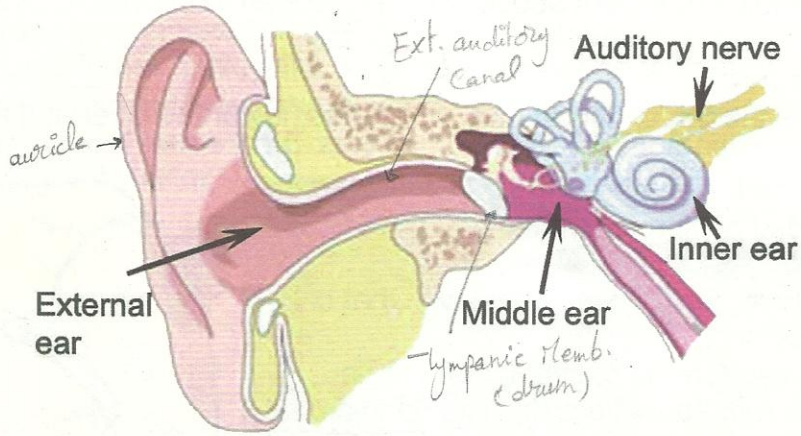
Contents

Ear



Ear

Anatomy:

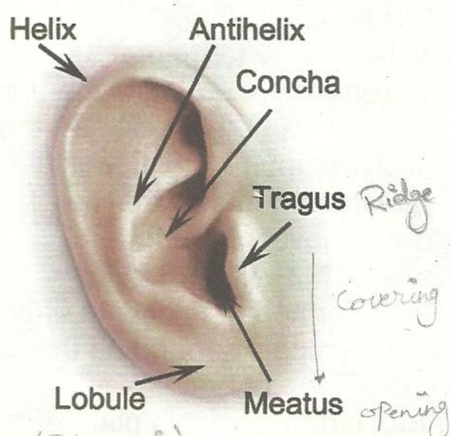


I- External ear:
Auricle
External Auditory Canal (EAC).
Tympanic membrane (Drum).

II- Middle ear:
Middle Ear Cavity (ME).
Mastoid air cells.
Eustachian Tube (ET).

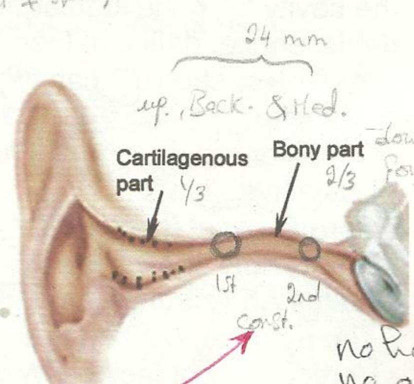
III- Inner ear:
Bony labyrinth.
Membranous labyrinth.

I- External ear:



A-*Auricle:* formed of cartilage covered by skin
Components: -
-Helix: Outer rolled edge.
-Antihelix: Y-shaped ridge anterior to the helix.
-Concha: Depression anterior and below to antihelix.
-Meatus: Opening of external auditory canal.
-Tragus: Ridge covering the meatus.
-Lobule: Fat covered by skin.

B-*External Auditory Canal:*
-24 mm in length.
- Formed of outer cartilaginous $^1/_3$ and medial bony $^2/_3$.
-The outer cartilaginous $^1/_3$ is: continuous with the cartilage of auricle; lined by thick skin containing hair follicles, sebaceous and ceruminous glands, its direction is upwards, backwards and medially.
-The medial bony $^2/_3$ is: part of temporal bone, lined by thin skin devoid of hair follicles and glands, its direction is downwards, forwards and medially.
-It has 2 constrictions: at the bony-cartilaginous junction and 5 mm from drum (isthmus).
-The medial end of the bony part has a narrow groove called the tympanic sulcus in which the tympanic annulus of the drum is lodged.



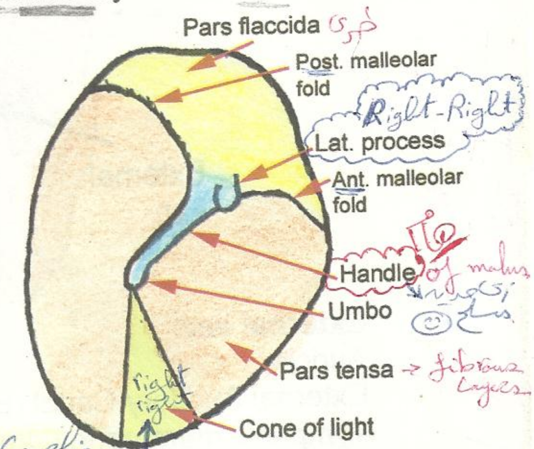
C-Tympanic membrane:

*Oval in shape, 9 x 8 mm, pearly white in colour, concave, surrounded by fibrous ring called tympanic annulus (deficient above) which is lodged in the tympanic sulcus, oblique (55° with the floor).

*Formed of 2 parts:

1-Pars flaccida: it is the upper flaccid part, which has no fibrous layer and not surrounded by fibrous annulus.

2-Pars tensa: it is the lower tense part, which has fibrous layer and surrounded by fibrous annulus.



*Layers of the drum:

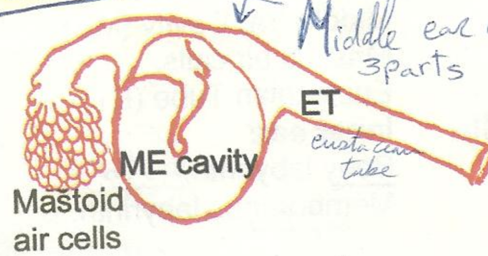
1-Outer epithelial layer (skin): continuous with that of external auditory canal.

2-Middle fibrous layer: formed of circular and radial layers, not present in the pars flaccida. The handle of malleus embedded in this layer.

3-Inner mucosal layer: continuous with that of the middle ear.

- The drum is 0.1 mm in thickness in adults but it is thicker in children.

N.B.: The cone of light appears during examination in the antero-inferior part due to the oblique position of the drum (55° with the floor).



II- Middle ear cleft:

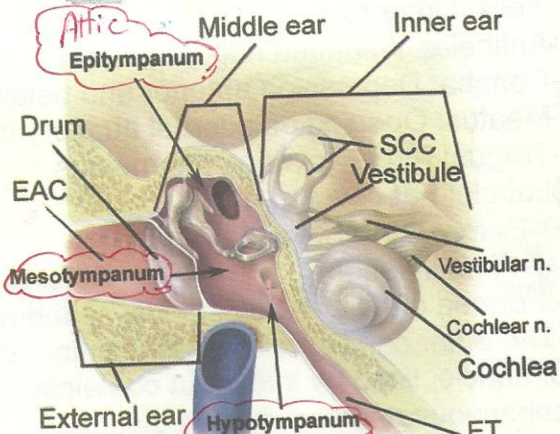
A-Middle ear cavity:

*6 walled cavity formed of 3 parts:

•Attic (epitympanum): it is the upper part, present above the level of drum, continuous posteriorly with the mastoid antrum through the aditus ad antrum.

•Mesotympanum: it is the middle part, present at the level of drum.

•Hypotympanum: it is the lower part, present below the level of drum.



***Walls of M.E. Cavity:**

1-Roof: formed of thin plate of bone called tegmen tympani separating the cavity from temporal lobe of brain.

2-Floor: formed of thin plate of bone separating the cavity from the jugular bulb (sometimes dehiscent i.e. deficient lead to high jugular bulb).

3-Anterior: shows 3 canals from above downward:
- Canal for tensor tympani muscle.
- Eustachian tube.
- Carotid canal (contain ICA).

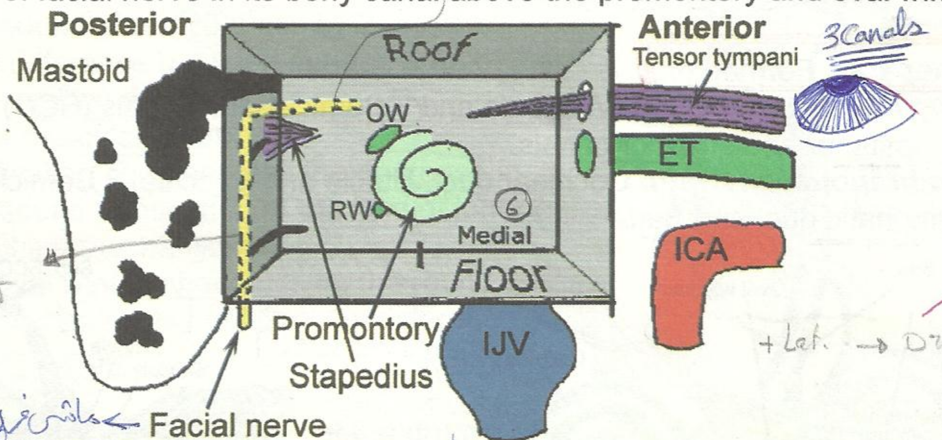
4-Posterior: shows 3 features from above downward:
- Aditus Ad Antrum (communicating the attic to the antrum).
- The pyramid: contain the stapedius muscle.
- Vertical part of facial nerve in its bony canal.

5-Lateral: formed of the drum, bone above and below it.

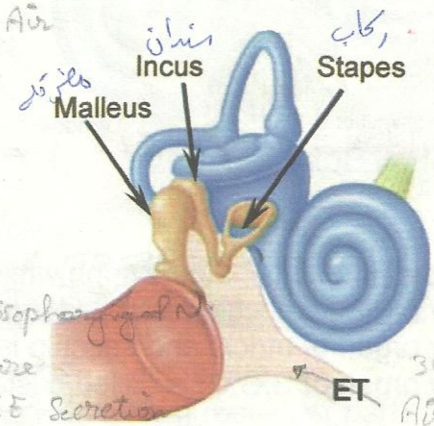
6-Medial: shows 6 features:

-Promontory: first (basal) turn of cochlea.

-Oval window: above and behind the promontory, closed by the footplate of stapes.
-Round window: below and behind the promontory, closed by secondary tympanic membrane
-Sinus tympani: depression between oval and round windows.
-Processes cochleariformis: pulley-like projection above and anterior to the promontory (the tensor tympani tendon turns 90° around it).
-Transverse part of facial nerve in its bony canal above the promontory and oval window.



*Contents of M.E. Cavity:
- 3 bones (ossicles) : Malleus, Incus and Stapes.
- 2 muscles:
. Tensor tympani supplied by trigeminal nerve.
. Stapedius supplied by facial nerve.
- 2 nerves:
. Chorda tympani (of 7th nerve).
. Tympanic plexus (of 9th nerve).
-Air: coming from Eustachian tube.

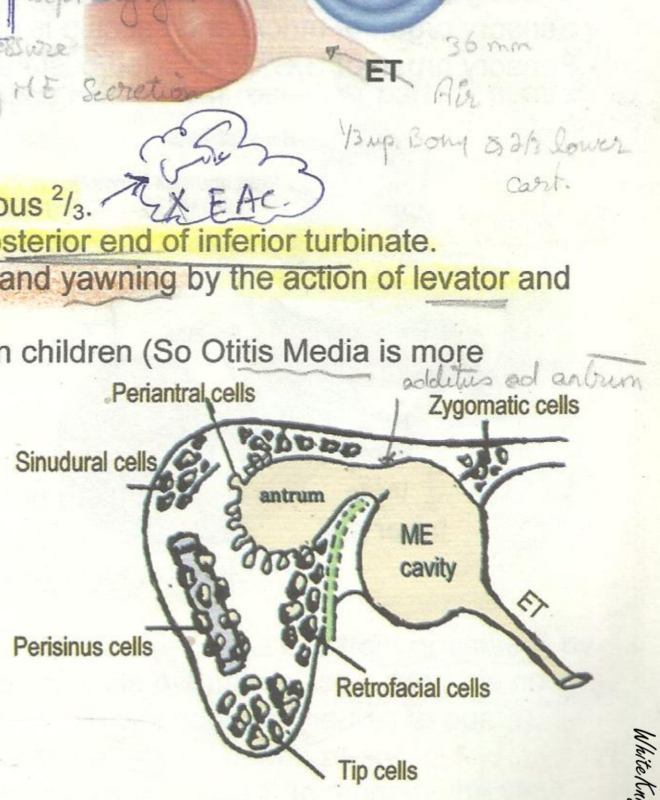


B-Eustachian tube (ET):
- 36 mm in length.
- Connecting the M.E. cavity to nasopharynx.
- Directed downwards, forwards and medially.
- Formed of upper bony $^1/_3$ and lower cartilaginous $^2/_3$.
- The lower opening present 1 cm behind the posterior end of inferior turbinate.
- It is normally closed, opens during swallowing and yawning by the action of levator and tensor palati muscles.

N.B: E.T. is shorter, wider and more horizontal in children (So Otitis Media is more common in children).

C-Mastoid air cells:
- Many cavities lined by mucous membrane, continuous together and with M.E. through aditus ad antrum.
- Formed of:

Antrum: is the largest air cell, communicates to attic through aditus, presenting 2 features in its medial wall, the lateral semicircular canal and 2nd genu of facial nerve.
Tip cells: at the tip of mastoid.
Peri-sinus cells: around sigmoid sinus.



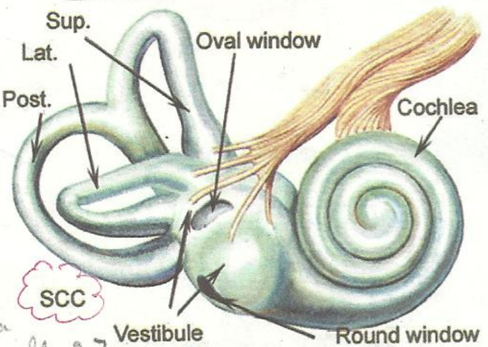
Sinu-dural cells: between dura and sigmoid sinus.
Retro-facial cells: behind the vertical part of facial nerve.
Zygomatic cells: in zygomatic process.
Peri-antral cells: around the antrum.

- Types of mastoid:

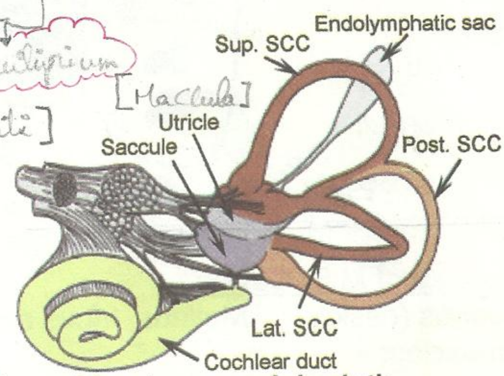
1- Cellular (pneumatic): 85%.
2- Acellular (sclerotic): 15%.
3- Diploic (contain bone marrow): in children.

III- Inner Ear: Formed of:

A- Bony labyrinth: Cochlea, Vestibule and 3 Semicircular Canals (SCC) which are the lateral, posterior and superior canals.
B- Membranous labyrinth: Cochlear duct, Utricle and Saccule, 3 Semicircular ducts, Endolymphatic duct and Sac.

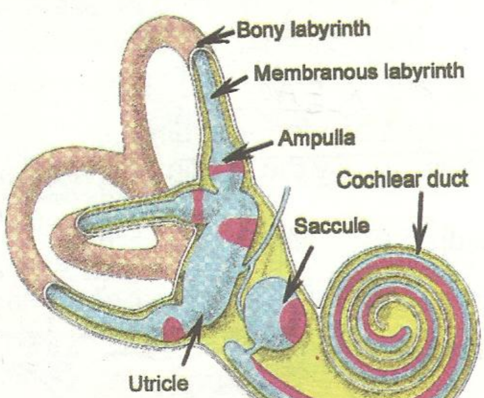


Bony labyrinth

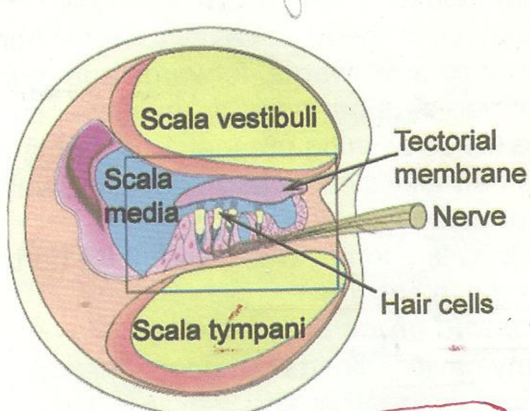


Membranous labyrinth

N.B.:
- Bony labyrinth contains perilymph while membranous labyrinth contains endolymph.
- Sensory organ of cochlea is called organ of Corti (Hearing).
- Sensory organ of utricle and saccule is called Macula (equilibrium).
- Sensory organ of S.C.C. is called crista ampullaris (equilibrium).



Inner ear



Cross section in cochlea to show organ of Corti

Physiology:

1- Auricle:

-Collecting the sound.
-Localizing the sound

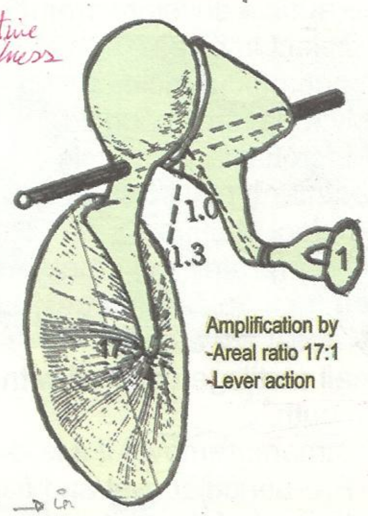
2- Ext. Aud.Canal: Conducting the sound.

3- Middle ear:

-Conduction of sound from drum to oval window through the ossicles.
-Amplification of sound about 20 times by 2 factors:
1-Areal ratio: the difference between surface area of the drum and that of oval window is 17:1.
2-Lever action of ossicular chain.

N.B.: This amplification compensates the decrease in sound when the sound transmitted to the fluid of inner ear (impedance matching mechanism).

N.B.: When the oval window becomes in, the round window will be out, this mechanism is called phase difference preventing ↑ inner ear pressure.

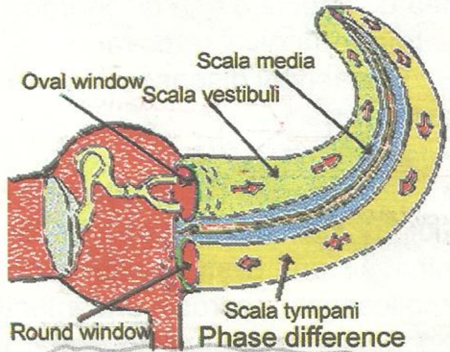


4- Eustachian tube:

-Equalization of pressure in both sides of the drum. (Ventilation).
-Drainage of middle ear secretion (lined by mucous membrane).

5- Inner ear:

a-Cochlear part : concerned with perception of sound (hearing)
b-Vestibular part: concerned with equilibrium, Utricle and Saccule are responsible for equilibrium in linear acceleration while S.C.C. are responsible for equilibrium in angular acceleration .

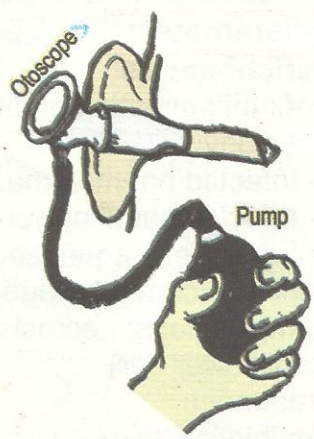


N.B.:
CHL (Conductive Hearing Loss): due to lesions in EAC or middle ear.
SNHL (Sensorineural Hearing Loss): due to lesions in inner ear (cochlear part) or central pathway of hearing.
MHL (Mixed Hearing Loss): CHL+SNHL
Vertigo: due to lesions in the inner ear (vestibular part) or central pathway of equilibrium.

N.B. Symptoms of ear diseases: see clinical ENT

-Deafness	-Tinnitus
-Discharge	-Pain (otalgia) and headache
-Vertigo	-Facial paralysis.
-Swelling and deformity.	-Eye symptoms.

N.B. Methods of ear examination: see clinical ENT
-External examination: for auricle, preauricular and postauricular (mastoid) areas by Inspection and Palpation.
-Otoscopy: by using otoscope to see the external auditory canal, tympanic membrane and middle ear.



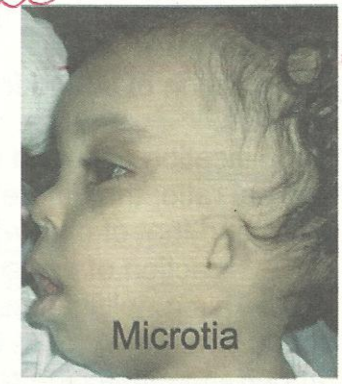
Seigalization

-Examination of tympanic membrane mobility (i.e. Eustachian tube is patent or closed) by
i-Valsalva's method: otoscopic examination of drum while the patient is blowing his nose.
ii-Seigalization: by using Seigle's pneumatic otoscope (otoscope connected to pump).
-Tuning fork tests: Rinne and Weber tests to detect the type of hearing loss.
-Examination of the ear under the microscope (sometimes needed) to magnify the view.

Diseases of the auricle

Congenital:

The auricle develops from 6 tubercles (from 1st and 2nd branchial arches).



Microtia

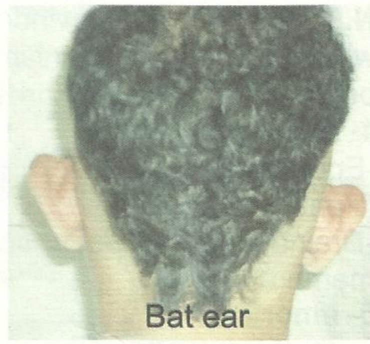
1- Defect in size:
- Anotia: no auricle.
- Microtia: small auricle.
- Macrotia: large auricle.

Treatment: plastic surgery before school age.

2- Defect in shape:

Bat ear (protruding or lop ear).

Treatment: plastic surgery before school age.



Bat ear

3- Accessory auricle:

Small cartilage covered with skin in the line from tragus to angle of mouth.

Treatment: removal if it is large.

4- Pre-auricular cyst and fistula:

At the root of the helix, presented with cystic swelling, repeated infection and discharge.

Treatment: surgical removal .

N.B.: Congenital diseases may be unilateral or bilateral.

Traumatic:

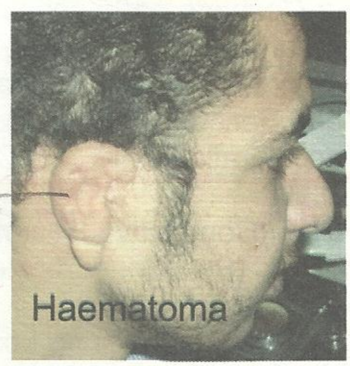
1-Haematoma:

Def.: Collection of blood between perichondrium and cartilage.

Aetiology: blunt trauma as box (Boxer's ear).

Clinical picture: cystic swelling (painful but not tender).

Complications: necrosis and infection of cartilage lead to perichondritis and cauliflower ear.



Haematoma

Treatment:

-Antibiotics.

-Incision and evacuation with application of tight bandage.

2-Lacerations: caused by sharp trauma.

3-Frost bite: necrosis of parts of auricle due to severe coldness.

Inflammatory:

Perichondritis:

Def.: Inflammation of the perichondrium of the cartilage of auricle.

Aetiology:

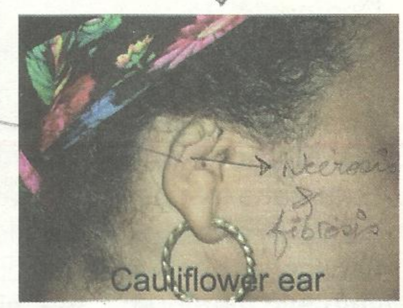
1- Infected haematoma.

2- Infected surgical wound.

3- Furuncle (if squeezed).

Clinical picture: the auricle is swollen, red, hot and tender.

Complications: necrosis of the cartilage, followed by fibrosis (cauliflower ear).



Cauliflower ear

Treatment:

-Antibiotics: local + systemic.

-Analgesics.

-Incision and drainage with debridment (removal of necrosed cartilage).

Neoplastic:

- Benign: papilloma or naevus (skin), chondroma (cartilage).
- Malignant: a) Sq. cell carcinoma. b) Basal cell carcinoma (Rodent ulcer).

Diseases of the external auditory canal (EAC)

1 Congenital:

Meatal atresia:

Def.: Obstruction of the meatus due to defect in 1st branchial arch (unilateral or bilateral).

Clinical picture:
- Microtia or Anotia of auricle: may be present.
- CHL sometimes mixed HL (if there is inner ear anomaly).

Investigations:
- CT: to see Middle ear, Inner ear and length of atresia.
- ERA: (See Audiology).



Meatal atresia with accessory auricle

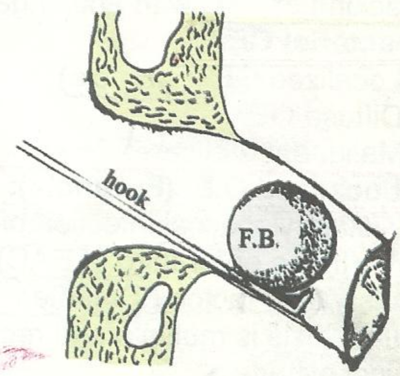
Treatment:
- Hearing aid: in bilateral cases to preserve hearing.
- Meatoplasty: done before school age in bilateral cases.
- Plastic surgery to the auricle (if there is microtia).

2 Traumatic:

Foreign body (FB) in external auditory canal

Type of patient: child or mentally retarded adult.

Type of FB:
- Animate: as flies.
- Inanimate: Vegetable as beans and seeds.
  Non-vegetable as beads, cotton and paper



Clinical picture:
- History of FB insertion.
- Irritation and noise (in animate FB).
- CHL (closure of EAC).

Complications:
- Injury to external auditory canal or drum.
- Infection to EAC (lead to otitis externa) or middle ear if the drum ruptured (otitis media).

Treatment:

Animate FB: Killed first by oil drops then ear wash.

Inanimate FB:
- Vegetable: removed by hook or suction (No ear wash as it swells with water).
- Non-vegetable: removed by ear wash, hook or suction.

N.B.: if the child is not co-operative we should use general anaesthesia.

3 Inflammatory:

Otitis externa (OE):

Def.: inflammation of external auditory canal (EAC).

1- Viral OE:

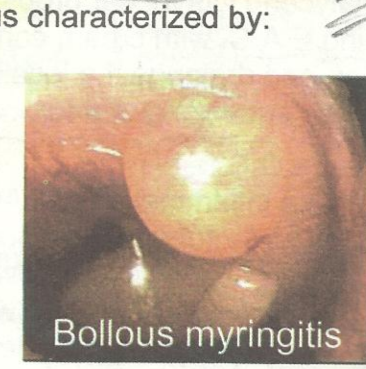
a) Herpes simplex: Occurs with fevers, characterized by vesicles.

b) Herpes zoster: caused by chickenpox virus, characterized by painful vesicles.

N.B.: *Ramsay-Hunt syndrome*: It is a herpes zoster oticus characterized by:
- Otalgia (pain),
- Vesicles,
- Facial paralysis (7th),
- SNHL and vertigo (8th), as it is a neurotropic virus.

Treatment:
- Analgesics for pain.
- Acyclovir: Local and systemic.

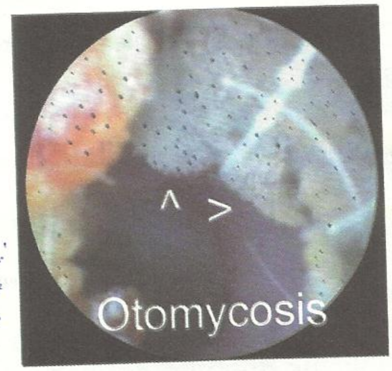
c) Bollous myringitis: characterized by bullae filled with serous fluid and may be blood in the outer layer of drum.



Bollous myringitis

Treatment:
-Analgesics for pain.
-Antibiotics: Local and systemic to prevent 2ry infection.

2- Fungal OE: Otomycosis

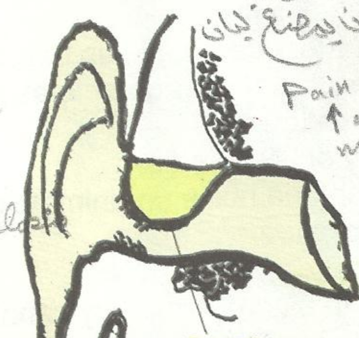


Def.: Fungal infection of external auditory canal.
Aetiology: Aspergillus Niger + Candida albicans.
Clinical picture:
Symptoms: - Itching in EAC.
- Deafness (if EAC is obstructed).
Signs: Fungal mass like a wet news paper (white mass and black spots)

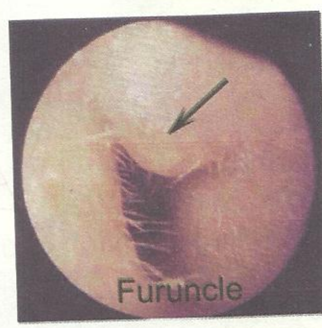
Treatment:
1-Local cleaning of EAC: suction or ear wash.
2-Antifungal ear drops as:
- Nystatin ear drops
-2% salicylic acid (Keratolytic) + Alcohol 70% (Fungicidal) ear drops.
3-Packing of EAC with antifungal cream on a piece of gauze (if resistant).

3- bacterial OE:
(a) Localized OE (Furuncle).
(b) Diffuse OE
(c) Malignant OE

(a) Localized O.E. (Furuncle):


Furuncle

Def.: staphylococcal infection of hair follicle (In the outer third of EAC).
Predisposing factors: Diabetes
(furunculosis is multiple and recurrent in diabetics).
Clinical picture:
. Symptoms:
- Pain (↑ on mastication).
- Discharge: Scanty, purulent, and cheesy.
- Deafness (if EAC is obstructed).



. Signs:
- Tenderness (on pulling the auricle or pressure on the tragus).
- Internal swelling in EAC, which is reddish (in outer $^1/_3$)
- External swelling: enlarged pre- and post-auricular lymph nodes.
Investigations: blood sugar in recurrent cases.
Treatment:
- General: Antibiotics + Analgesics.
- Local:
. Local cleaning of EAC (never by ear wash). adsord water
. 10% Glycerin icthyol ear drops (Glycerin is hygroscopic, while icthyol is counter irritant)
. Packing E.A.C. with cream containing: Antibiotic + Steroid.
. Incision and drainage if a localized abscess has formed.
N.B: Avoid squeezing of a furuncle (lead to perichondritis).

(b) Diffuse O.E.:
Def.: diffuse inflammation of EAC.
Predisposing factors:
- Scratch of EAC.
- Swimming in infected swimming pool
- Sweating if excessive.
- Seborrhea.
- Sugar (Diabetic).

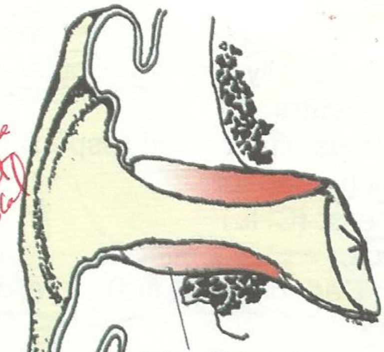
Clinical picture:

. Symptoms:

- Pain (↑ on mastication).
- Discharge: Scanty and purulent.
- Deafness: (if EAC is obstructed)

. Signs:

- Tenderness (on pulling the auricle or pressure on the tragus).
- Internal swelling: Diffuse red, oedamatous EAC.
- External swelling: pre and post-auricular lymph node enlargement.



Oedema and congestion

Diffuse otitis externa

Investigations:

1) Blood sugar for diabetes (if recurrent)
2) Culture and sensitivity of discharge (if resistant).

Treatment:

- General: Antibiotics + Analgesics.
- Local:

. Local cleaning of EAC.

contraction of tissue BV dec secretion

. 8% Aluminium acetate packing (astringent).

. Packing E.A.C. with cream: containing antibiotic + steroid.



Diffuse OE

(c) Malignant otitis externa (skull base osteomyelitis):

Def: Severe infection starts in the EAC (i.e. cellulitis) and spread to involve skull base (i.e. osteomyelitis).

Causative organism: Pseudomonas aureginosa.

Predisposing factors: low general resistance as diabetes.

Clinical picture:

. Symptoms: as diffuse O.E. but the pain is severe and prolonged.

. Signs: as diffuse O.E. with granulations in the floor of EAC at the bony-cartilaginous junctions.

Extensions: due to osteomyelitis

a) Facial palsy (compressed at stylomastoid foramen).
b) Parotid swelling.
c) Lower 4 cranial nerves palsy (compressed at jugular foramen).
d) Trigeminal facial pain if it extend to petrous apex.

Investigations:

- Culture and sensitivity → pseudomonas aureginosa.
- Fasting blood sugar
- C T Scan.
- Gallium and Tecntium scan.
- Biopsy from the granulations→ to exclude tumour

Treatment:

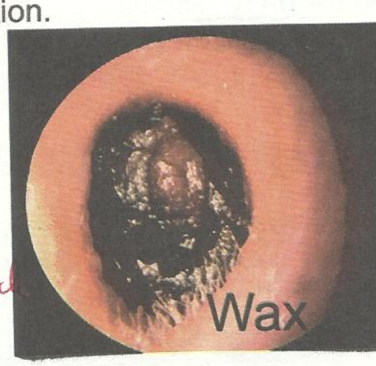
- Hospitalization and control of diabetes.
- Antibiotics: systemic Quinolones, as Ciprofloxacin (for pseudomonas)
- Ear drops: Ciprofloxacin.
- Surgical debridement: sometimes needed.

Neoplastic:

- Benign: Exostosis (Osteoma of EAC, may be single or multiple, unilateral or bilateral).
- Malignant: squamous cell carcinoma.

Ear Wax

Def.: normal secretions of ceruminous and sebaceous glands (in outer $^1/_3$ of EAC)
N.B.: it is usually cleared spontaneously by epithelial migration.



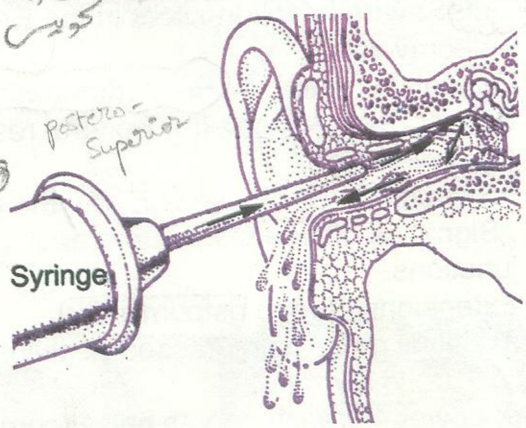
Clinical picture:
. Symptoms: if impacted (especially after bathing or swimming) lead to:
- Deafness: (CHL)
- Tinnitus.

. Signs: Dark brown (hard) or yellowish (soft) wax seen by otoscope.

Treatment: Ear wash
(If it is hard, it should be softened by glycerin bicarbonate or H_2O_2 ear drops before wash).

Ear Wash

- **Indications:**
  - Wax (if excessive or impacted).
  - FB (not impacted and not vegetable).
  - Otomycosis (Fungal mass).
  - Caloric test: to test the vestibular function (see vertigo).
- **Contraindications:**
  - Perforation (traumatic or pathological i.e. CSOM).
  - FB (impacted or vegetable).
  - Otitis externa (bacterial or viral).
- **Technique:**
  - The patient should be seated with a towel covering his clothes.
  - A syringe filled with warm water (about 37° to avoid vertigo) and the nozzle is directed postero-superior (to avoid injury of the drum), after wash dry the EAC with alcohol.



- **Complications:** 2 I + 2 S
  1. Injury to: E.A.C. or Drum (Rupture).
  2. Infection to: E.A.C. (Otitis Externa) or M.E. (Otitis Media) after rupture of the drum.
  3. Stimulation of inner ear lead to vertigo and nystagmus.
  4. Stimulation of vagus lead to reflex cough and vaso-vagal attack.

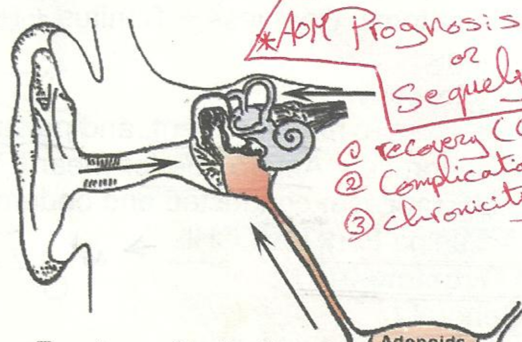
N.B. Manifestations of drum rupture during ear wash:
- Sudden pain.
- Bleeding.
- Deafness and tinnitus.
- Fluid trickling in the throat.

*Give an account on AOM?

Acute Otitis Media (AOM)

- **Definition:** acute inflammation of mucosal lining of middle ear cleft.
- **Aetiology:**

-Causative organism
1. Strept. Pneumoniae
2. Hemophilus influenza.
3. Moraxella catarrhalis.



Routes of infection

*AOM Prognosis or Sequely?
1. recovery (Cure)
2. Complication
3. chronicity

-Routes of infection:

(a) Eustachian tube (ET)

A *Extension of infection:
1. - Nose: Rhinitis of common cold, Influenza and exanthemata.
2. - Sinuses: sinusitis
3. - Nasopharynx: adenoid.

B *Passage of infected material
1. - Vomitus.
2. - Infected milk.
3. - Infected water.
4. - Nasal packing.

(b)Ext. Aud. Canal (EAC): in cases of perforated drum.

(c)Blood spread: Rare.


Normal drum

- **Pathology:** 5 stages

1- Tubal catarrh: oedema and congestion of ET lead to its obstruction and retraction of drum due to –ve middle ear pressure.
2- Catarrhal O.M.: Oedema and congestion of M.E. mucosa.
3- Suppurative O.M. (ASOM): accumulation of pus in M.E.
4- Perforation: due to necrosis of the drum lead to discharge.
5- Recovery: healing of drum and resolution of pathological changes.


Retracted drum

- **Clinical Picture:**

- It corresponds to the stages of pathology.
- Recovery may occur at any stage if adequate treatment is given.

(1) Tubal catarrh:

Symptoms: Deafness + Tinnitus.

Signs:

1- Otoscopy: retracted drum, which is seen as:
-Prominent lateral process.
-Shortened handle of malleus.
-Disturbed or absent cone of light.
-Exaggerated ant. and post. malleolar folds.
-Limited mobility on siegalization.

2- Tuning Fork (T.F.) test: CHL.


Congested drum

(2) Catarrhal O.M.:

Symptoms: Deafness + Tinnitus + Pain.

Signs:

1- Otoscopy: congested drum (Mainly at the periphery and the handle).

2- Tuning Fork test: CHL.


Bulging drum

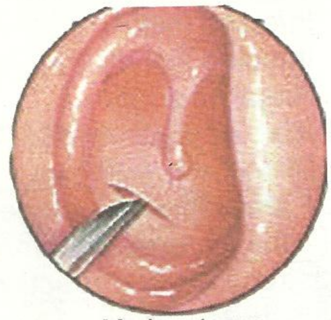
(3) Suppurative O.M.:

#Symptoms: Deafness + Tinnitus + Pain (throbbing) + Fever.
#Signs:
1- Otoscopy: bulging drum.
2- Tuning Fork test: CHL.
(4) Perforation:
#Symptoms: Deafness + Tinnitus + Pain (less) + Fever (less) + discharge.
#Sings:
1- Otoscopy:
- Discharge: mucopurulent, and pulsating.
- Perforation: Antero-inferior (near ET opening).
- ME mucosa: congested and oedematous.
2- Tuning Fork test: CHL.

♦ Treatment:

General:
(a) Systemic antibiotics.
(b) Analgesic antipyretic.

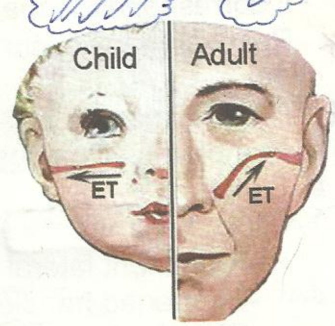
Local: according to the stage.
(a) In ET catarrh: decongestant nasal drops as xylometazoline
(b) In catarrhal OM: Glycerin phenol warm ear drops, as glycerin is hygroscopic, phenol is local anaesthetic, warm to increase vascularity.
(c) In suppurative OM (Bulging drum): Myringotomy.
(d) In perforation:
- Myringotomy (if the perforation is small or high up).
- Repeated cleaning by suction or dry mopping.
- Local antibiotic ear drops.


Myringotomy

N.B.: Necrotizing O.M.: occurs in exanthemata leading to total necrosis of the drum.

A.O.M. in infants and Children

Definition: Acute inflammation of mucosal lining f middle ear cleft.
Causative organisms: as before (in AOM)
Predisposing factors: ARTER
* Adenoid: ET obstruction and infection.
* Respiratory tract infection: common cold and exanthemata are more common in children.
* Teething → ↓ immunity.
* Eustachian tube: shorter, wider and more horizontal in children.
* Regurgitation of milk or vomitus:



Milk: Artificial fed baby is more liable than breast fed due to:
- Artificial milk is liable to be contaminated.
- Artificial milk contains no antibodies (↓ immunity).
- The flat position with artificial feeding.

Vomitus: in gastro-enteritis may pass through Eustachian tube.

Clinical Picture:
[1] Symptoms:
General:
-Fever and rigors (the heat regulating center is not fully developed in infants).
-Vomiting and diarrhea may be misdiagnosed as gastroenteritis.
-The child cries and dose not sleep (due to pain).

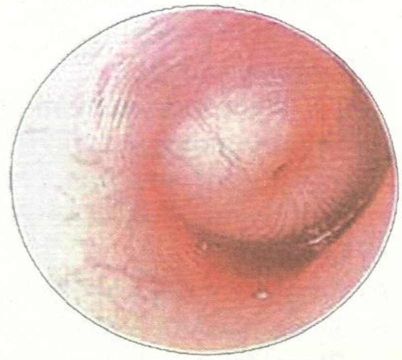


It is more blessed to give than to receive.

Local:
-Pulling the ear.
-Movement of head from side to side.

[2] Signs: There may be only absence of cone of light or congestion as the drum of children is thick and resist bulging.

N.B.: Complications of AOM are more common in infants than in adults due to:
1-The drum is thick → resisting bulging.
2-↓Immunity of infant.



Treatment:
1) General:
-Systemic antibiotics.
-Analgesic antipyretics.
2) Local:
-Decongestant nasal drops as xylometazoline to open ET.
-Glycerin phenol warm ear drops.
-Myringotomy: may be needed early
(If medical treatment failed for 48 hours) to avoid complication.
It is done in postero inferior part of drum, followed by suction and antibiotic ear drops.

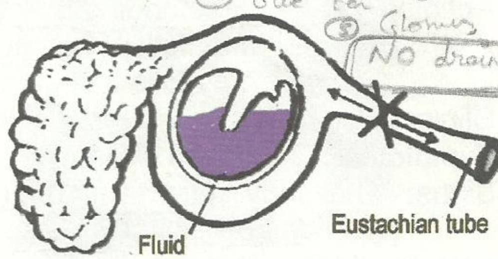
Chronic Otitis Media

Types:
1- Chronic non-suppurative O.M.:
(a) Secretory O.M. (S.O.M).
(b) Adhesive O.M.
2- Chronic suppurative O.M.:
(a) Safe (Mucosal - tubo tympanic).
(b) Unsafe (bony-Attico antral).

1 *Chronic non-suppurative O.M.:*

A Secretory otitis media (Glue ear-Middle ear effusion):

♦**Def.:** accumulation of non-purulent effusion behind an intact drum.
♦**Types:**
A-Serous: transudation of fluid from blood vessels due to –ve ME pressure.
B-Mucoid: active secretion by mucosal glands of ME.



♦**Aetiology:**
1- Otitis media if acute, recurrent with inadequate treatment.
2- Viral infection.
3- Eustachian tube obstruction by adenoid, or infection.
4- Cleft palate (deficient palatal muscles).
5- Tumour in the nasopharynx: (old age, unilateral).
6- Radiotherapy to head and neck.
7- Allergy of M.E. Mucosa.

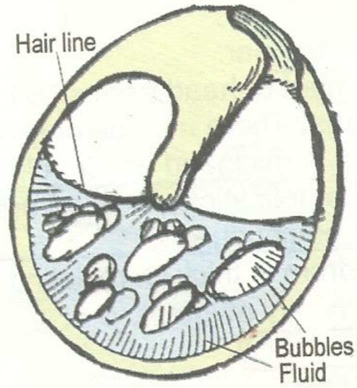
♦ **Clinical picture**:
#Symptoms:
1) Deafness and Tinnitus: may be unilateral or bilateral (in adenoid), usually the child presented with school retardation.
2) Bubbling sensation in the ear: usually in adults.

#Sings:

1) Otoscopy:

- Intact drum and its colour is: amber yellow (in serous) or dull gray (in Mucoid).
- There may be fluid level (hair line).
- There may be bubbles.

2) Tuning Fork test: CHL.



♦ **Investigations:**

- PTA (Pure tone audiometry) → CHL.
- Tympanometry → type B (flat curve).
- X-ray lateral view nasopharynx for adenoid.



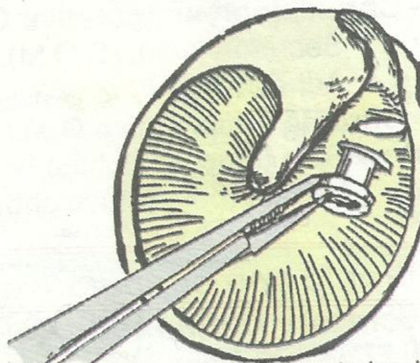
♦ **Treatment:**

1) Medical:

A- Treatment of cause: infection or adenoid.
B- Systemic Antibiotics to prevent recurrent infection.
C- Steroids: withdrawal method.
D- Mucolytics: to dissolve mucoid secretion.
E- Decongestant nasal drops to open ET.
F- Valsalva maneuver and chewing gum to open ET.

2) Surgical: if medical treatment failed.

Myringotomy and insertion of ventilation tube with adenoidectomy if there is adenoid.
The incision in the drum will be in anterosuperior part (as it is the least migratory area → delay tube extrusion).



Myringotomy and Grommet's tube insertion

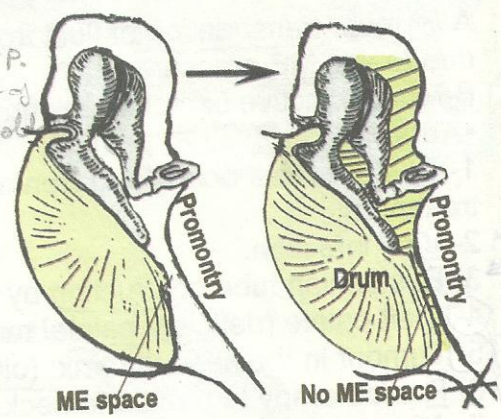
Types of ventilation tube:

- Grommet's tubes: temporary tubes, as spontaneous extrusion occurs within 6 months.
- T-tubes: permanent tube, preferred in adults.

B Adhesive Otitis Media:

Def.: Retraction of the drum, which become in contact with the promontory (atelectasis) with adhesion of ME structure.

Aetiology:
- Long standing ET obstruction.
- It may follow Secretory OM.
- It may follow healed CSOM.



Clinical picture:
Symptoms: Deafness + Tinnitus.
Signs: - Otoscopy: retracted drum (signs?).
- Tuning Fork test: C.H.L.

Investigations:
- PTA → CHL.
- Tympanometry → type C (E.T. dysfunction).

Treatment:
- Prophylactic: treat the cause.
- Curative: - Cartilage tympanoplasty.
Or - Hearing aid.

C N.B. Tympanosclerosis:

Def.: White patches seen through the tympanic membrane (a type of fibrosis).
Pathology: Hyaline degeneration of the collagen bundles with calcification.
Clinical picture: CHL
Treatment: Surgery usually fails, hearing aid is better.

Chronic suppurative Otitis Media (CSOM)

Def.: Chronic inflammation of mucoperiosteal lining of M.E. cleft characterized by perforation and discharge (persistent or intermittent).

Types: 1- Safe.
2- Unsafe.

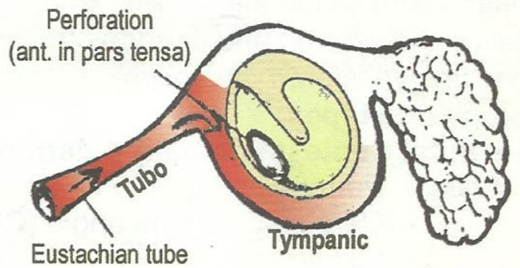
Safe CSOM: (Tubotympanic or mucosal CSOM)

Characters:

- Affects mucosa of ME cleft.
- Less liable to produce complications.

Aetiology: AOM → CSOM due to:

1- ↓ Treatment due to:
  a- Ineffective antibiotics.
  b- Short course of antibiotics.
  c- Inadequate drainage.
2- ↑ Virulence of organism.
3- ↓ Resistance of the patient.



Clinical picture:

Symptoms:

- Deafness + tinnitus.
- Intermittent discharge.

Signs:

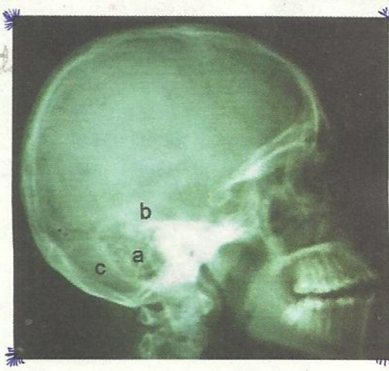
(1) Otoscopy:

- Discharge: profuse, mucopurulent, odourless.
- Perforation: central in the pars tensa (there is rim of the drum all round the perforation and not reaching to annulus).
- ME Mucosa: may be either:
  (a) Thin pale and dry: if inactive.
  (b) Oedematous and congested: if active infection.
  (c) Granulations: sessile reddish tissues, which bleed on touch.
  (d) Polyp: pedunculated, oedematous mucosa passing through perforation.

(2) Tuning Fork test: CHL.

Investigations:

1- PTA → CHL.
2- Culture and sensitivity of discharge.
3- X-ray mastoid (Schüller view): shows
  a- State of mastoid (areation).
  b- Level of dura.
  c- Position of sigmoid sinus.



Treatment:

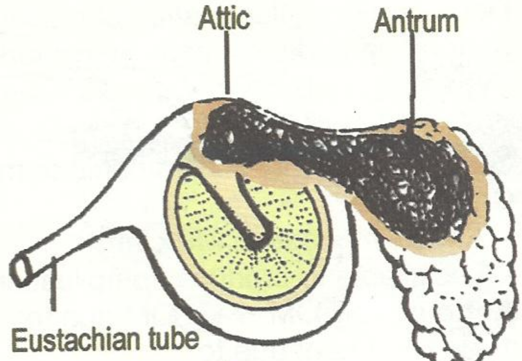
1- Medical:
 (a) General: Systemic antibiotics (Given according to culture and sensitivity).
 (b) Local: - Local antibiotic ear drops.
  - Aural toilet by suction or by dry mopping.
 (c) Prevention of re-infection by:
  - Avoid wetting of the ear (keep it dry).
  - Control any upper respiratory infection as common cold.

2- Surgical treatment: Tympanoplasty with or without cortical mastoidectomy.

N.B.: Tympanoplasty should be combined with cortical mastoidectomy if there is discharge.
But if the ear is dry → Tympanoplasty without cortical mastoidectomy (Myringoplsty).

Unsafe CSOM: (Attico-antral or bony CSOM or Cholesteatoma)

♦**Characters:**
- Erosion of bone.
- More liable to produce complications.



♦**Def. of Cholesteatoma:** The name is wrong as:
Cholest: not necessarily contain cholesterol.
Oma: not a tumour.
It is a sac of keratinized stratified squamous epithelium (skin) called matrix filled with keratinous material (± cholesterol) and it erodes the bone by osteolytc enzymes or 2ry infection.

♦**Aetiology and types:**

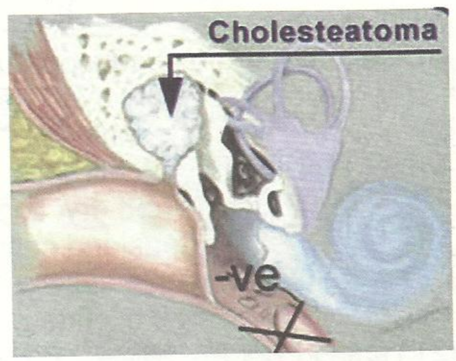
1- Congenital Cholesteatoma (Epidermoid):
- ♦ Sites: - Petrous apex.
  - Cerebello pontine angle (CPA).
  - Middle ear.

N.B.: The drum is intact.
- ♦ Clinically presented by:
  - Trigeminal facial pain (if present in petrous apex).
  - Facial tics then paralysis + SNHL + vertigo (if present in CPA).
  - CHL (if present in ME).

2- Acquired Cholesteatoma:

A- 1ry Acquired Cholesteatoma:
- 1ry means not preceded by OM.

- Causes:



*Retraction pocket theory: prolonged ET obstruction → -ve ME pressure → invagination of part of the drum forming retraction pocket (the weakest part is the pars flaccida (no fibrous layer) or postero-superior part of the drum. This pocket will be filled with keratin forming cholesteatoma.

B- 2ry Acquired cholesteatoma:
- 2ry means preceded by O.M. (i.e. 2ry to safe CSOM).

- Causes:
*Metaplasia theory: Squamous metaplasia of ME mucosa by chronic irritation.
*Migration theory: migration of the epithelium of EAC to ME through perforation.

♦ **Clinical picture:**

Symptoms:
- Deafness + tinnitus.
- Persistent discharge.

Signs:
(1) Otoscopy:
- Discharge: scanty, purulent, offensive may contain epithelial debris.
- Perforation: marginal (not surrounded by rim of drum all round and reaching to the annulus) or attic in the pars flaccida.
- Retraction pocket may be seen in postero-superior part in early stages of cholesteatoma (during its formation).
- Cholesteatoma itself may be seen as whitish epithelial mass.
- ME Mucosa: may show granulations or polyp, which are more frequent in unsafe CSOM.

(2) Tuning Fork tests:
- CHL except if there is erosion of inner ear (labyrinthitis) → mixed HL.

- **Investigations:**

1-PTA (Pure tone audiometry).
2-Culture and sensitivity of discharge.
3-X-ray mastoid: show the same finding as safe CSOM + bone erosion.
4-CT: If complications were suspected.

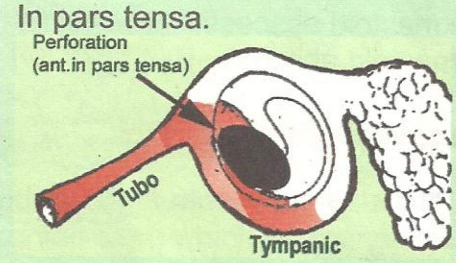
- **Sequalae of Cholesteatoma:**

1-Expansion: due to repeated infection and formation of keratin.
2-Bone erosion: of
  a- Mastoid lead to natural cavity.
  b- Ossicles: lead to hearing loss.

N.B.: The commonest part to be eroded in CSOM is the long process of incus (as it is slender and less vascular).
3-Mastoid sclerosis: it becomes less cellular.
4-Complications may occur.

- **Treatment:**

- The treatment is **surgical.**
- The classic treatment is radical mastoidectomy (See operations).

	Safe CSOM	Unsafe CSOM
Discharge	Intermittent Profuse Mucopurulent Odourless No epithelial debris	Persistent Scanty Purulent Offensive (Bone necrosis) May contain epithelial debris
Perforation	Central In pars tensa. 	Marginal or Attic In pars flaccida. 
ME Mucosa	-May be dry -Or congested. -Granulations and polyps are less common.	Usually show Granulations or polyp.
Complications	Less common	More common.
Treatment	Tympanoplasty	Radical mastoidectomy

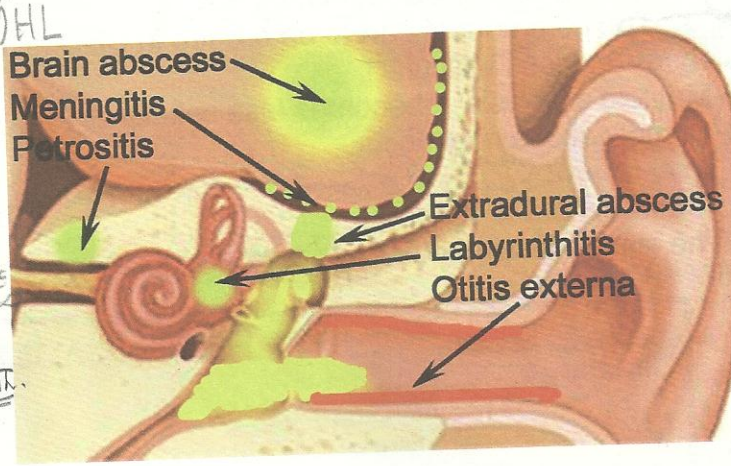
N.B.: There are 2 lines for treatment of cholesteatoma: See operations
A) Canal wall up (closed) Technique.
B) Canal wall down (open) Technique.

Complications of suppurative OM

- **Def.:** Extension of infection beyond muco-perioseal limit of ME cleft.
- **Aetiology:**
  1- Acute suppurative OM especially in infants and children.
  2- CSOM especially cholesteatoma.
  3- Acute exacerbation on top of CSOM.
- **Types:**

I-Cranial complications (in the bone):

1- Mastoiditis.
2- Labyrinthitis.
3- Petrositis.
4- Facial paralysis.



II-Intra cranial complications:

1- Extradural abscess.
2- Subdural abscess.
3- Meningitis.
4- Brain abscess.
5- Lateral sinus thrombophlebitis.
6- Otitic hydrocephalus.

III-Extra cranial complication:

1- Otitis externa: secondary to discharge.
2- Jugular vein thrombosis: extension from lat. Sinus thrombosis.
3- Bezold's abscess: extension from mastoid abscess.
4- Citteli's abscess: extension from mastoid abscess.

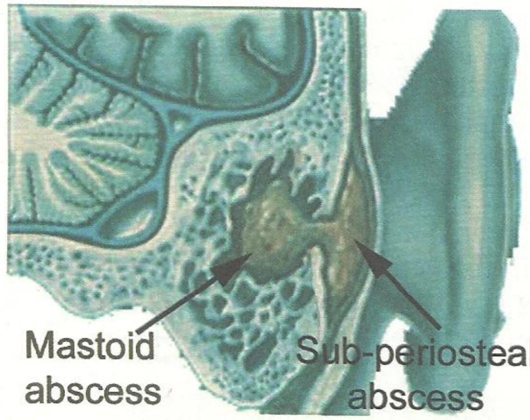
N.B: Warning manifestations of complications in CSOM:

1- Pain.
2- Headache.
3- Fever.
4- Vertigo.
5- Facial paralysis.

N.B: CSOM is never painful except in:

1- Complications.
2- Acute exacerbations.
3- Rarely, malignant transformation.

I Acute Mastoiditis

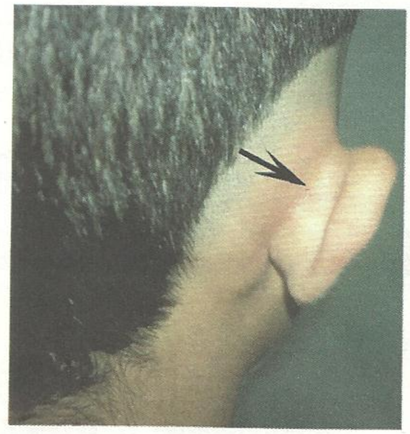


- **Def.:** Acute inflammation of mastoid antrum and air cells with destruction of their bony partitions.
- **Pathology:**

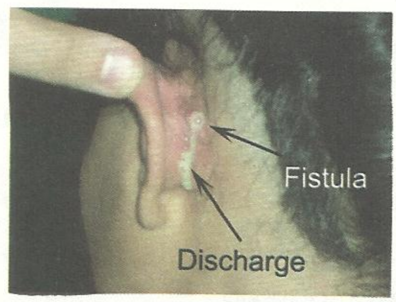
a- Destruction of bony partitions between mastoid air cells → large cavity filled with pus.
b- Extension of infection under the periosteum:
1-Post-auricular (mastoid) abscess: Lateral extension from antrum.
2-Sagging of postero-superior meatal wall: Anterior extension (it is a diagnostic sign)
3-Zygomatic abscess: Lateral extension from zygomatic air cells.
4-Bezold's abscess: Inferior extension along the sternomastoid muscle sheath.
5-Citteli's abscess: Inferior extension along the digastric muscle sheath.
c- Rupture of periosteum and fistula formation.

- **Clinical picture:**

Symptoms:
General: fever, headache and malaise.
Local:
-Deafness + tinnitus + discharge (of OM).
-Pain: post-auricular (become throbbing on abscess formation).
-Swelling: in abscess formation.

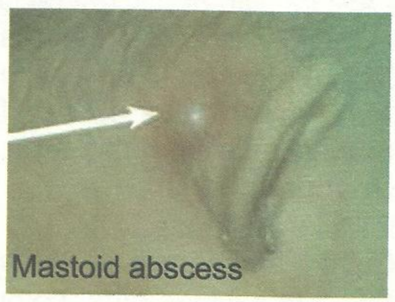


Signs:
-General: ↑Temperature (Fever).
↑Pulse (tachycardia).
-Local:
Ear examination:
* Otoscopy:
-Discharge: profuse and recollect rapidly after suction (It is called Reservoir sign) which is diagnostic).
-Sagging of postero-superior meatal wall (diagnostic sign).
-Perforated drum (may be intact and congested in infants).



Mastoid Examination:
- **Swelling:** either
* Post-auricular → pushing the auricle downwards and forwards.
* Zygomatic → above and in front of auricle at root of zygomatic process.
* Bezold's → in upper lateral part of the neck (rare).
* Citteli's → in submandibular region (rare).

-**Tenderness**: over the antrum (marked by cymba concha), tip of mastoid and posterior border (as these are the most superficial air cells).



- **Investigations:**

- PTA → CHL.
- Culture and sensitivity of discharge.
- X-ray mastoid → clouding (opacity) of mastoid air cells.
- CT → to detect the mastoiditis and to exclude other complications.

- **Treatment:**

A) Medical:

-Hospitalization.

-Systemic antibiotics according to culture and sensitivity.

-Analgesic antipyretic.

-Frequent suction of discharge and local antibiotic ear drops.

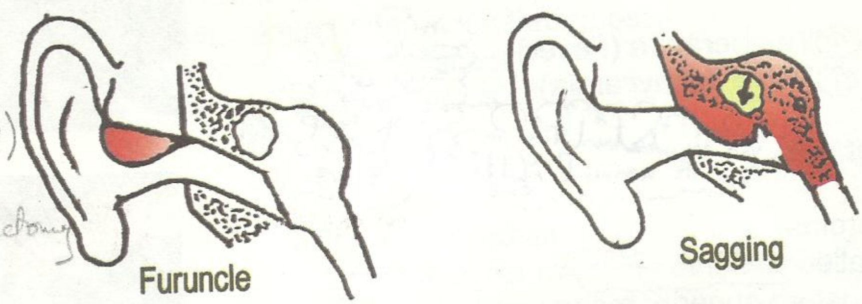
B) Surgical:

Cortical mastoidectomy: if the medical treatment failed (for 48 hours), if there is abscess and if associated with other complication (also myringotomy is needed in children).

N.B.: Differential diagnosis of Mastoiditis

(a) Furuncle:

	Furuncle	Mastoiditis
History:	Scratch	O.M.
Pain:	On mastication	Not related to mastication
Deafness:	if it occludes the canal (not severe)	Usually present and severe.
Tenderness:	Over the tragus	Over mastoid.
Discharge:	Scanty, purulent and cheesy.	Profuse, Mucopurulent with +ve Reservoir sign.
Swelling:	In outer $^1/_3$ of EAC.	Deep in the posteor-superior part of EAC (Sagging).
Post. auricular groove	Obliterated	Preserved
Drum:	Normal	Usually perforated
X-ray mastoid:	Normal	Clouding of air cells.



(b) Post-auricular lymphadenitis: scalp infection.

2 Facial Paralysis (due to OM)

Aetiology:

A- ASOM with dehiscent facial bony canal.

B- CSOM with cholesteatoma eroding the facial canal.

Clinical picture: Deafness, tinnitus and discharge (of OM) + L.M.N. (lower motor neuron) facial paralysis of acute onset in ASOM and gradual onset in CSOM (Partial or complete): see clinical picture of facial paralysis.

Investigations:

- PTA → CHL
- Culture and sensitivity of discharge.
- CT → to exclude other complications.
- Tests to detect the level of paralysis.

Treatment:

A) Medical: - Antibiotics (systemic and local).
- Steroid (anti-oedematous to decompress the nerve).

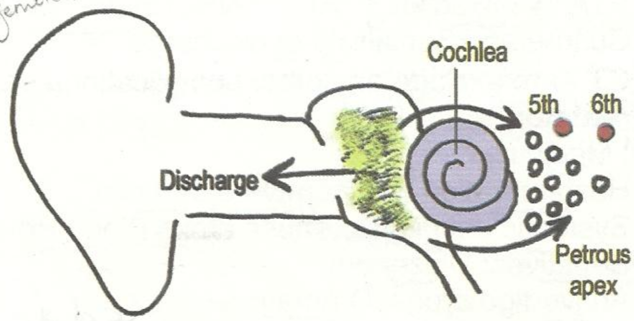
B) Surgical: myringotomy in AOM and radical mastoidectomy in cholesteatoma.

3 Petrositis

Def.: Inflammation of the air cells in the petrous apex (present in 30%).
Predisposing factor: Complications to O.M. in diabetic patient.
Clinical picture:

Gradenigo's triad:
- -Discharging ear.
- -Diplopia and squint (6th nerve affection)
- -Facial pain (5th nerve affection).

Investigations:
- PTA → CHL
- Culture and sensitivity of discharge.
- CT → to detect petrositis and to exclude other complications.



Treatment:

a) Medical:
- Hospitalization and control of diabetes.
- Systemic antibiotics
  (According to culture and sensitivity)

b) Surgical: Radical mastoidectomy and drainage of infected air cells.

4 Labyrinthitis

Def.: Inflammation of inner ear.
Pathology:

a) Localized Labyrinthitis:
Bone erosion by cholesteatoma lead to fistula.
The commonest site for Labyrinthine fistula is the lat. SCC.

b) Diffuse Labyrinthitis:
1.Serous labyrinthitis: Serous fluid in inner ear (no pus).
2.Suppurative labyrinthitis: pus in inner ear → destruction of neuro-epithelium lead to permanent SNHL.

N.B.: Suppurative labyrinthitis may lead to Meningitis by spread through internal auditory canal, indicated by fever, headache and neck rigidity.

Clinical picture:

Deafness, tinnitus and discharge (of OM) +

a) Labyrinthine fistula (Localized):
- It may be asymptomatic if small.
- Intermittent vertigo, without nausea or vomiting.
- Nystagmus; rapid phase towards the diseased ear (irritative).
- Positive fistula sign: Vertigo + Nystagmus on
  - Pressure on the tragus.
  - ↑ EAC pressure by Seiglization.
  - Manipulation of aural polyp.

N.B.: The test may be -ve even in the presence of a fistula (false –ve test) if:
- * The fistula is very small.
- * The fistula is closed by cholesteatoma.
- * Inadequate sealing of EAC during Seiglization.
- * Dead ear.

b) Serous Labyrinthitis:
- Continuous vertigo with nausea and vomiting.
- Nystagmus; rapid phase towards the diseased ear (irritative).
- Reversible SNHL.

c) Suppurative Labyrinthitis:
As Serous Labyrinthitis but the condition is more severe and the rapid phase of nystagmus is directed towards the normal side (Paralytic), and the SNHL is irreversible.
N.B.: How to differentiate between serous and suppurative labyrinthitis?
Retrograde (if SNHL improved with treatment, the condition was serous, if not → suppurative).

Investigations:
- PTA → Mixed HL (CHL + SNHL) in diffuse labyrinthitis.
- Culture and Sensitivity of discharge.
- CT → to exclude any other complications.

Treatment:
a) Medical:
- Hospitalization with complete bed rest.
- Systemic antibiotics: Those cross Blood Brain Barrier (Chloramphenicol or Cefuruxim).
- Sedatives: Diazepam.
- Antivertigo drugs: Dramamine.
- Antiemetics as Chlorpromazine.

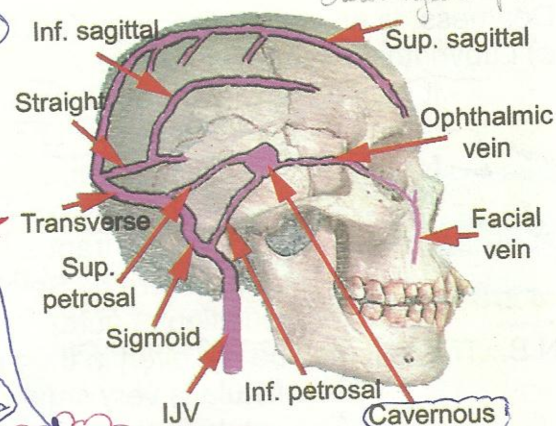
b) Surgical: Radical mastoidectomy with
- In fistula: removal of cholesteatoma and covering the fistula with temporalis fascia graft.
- In suppurative Labyrinthitis: Labyrinthectomy.

N.B.: Serous labyrinthitis will be improved with medical treatment.

5 Lateral Sinus Thrombophlebitis

Def.: Thrombosis and infection of lateral venous sinus (sigmoid + transverse).
Pathology: Periphlebitis (infection of perisinus air cells) i.e. around the sinus → Endophlebitis i.e. irritation of intema which become rough → thrombosis which propagate and become infected, may be detached → septic emboli.

Clinical picture:
* Symptoms: Deafness, tinnitus and discharge (of OM) +
1- **Intermittent fever**: Irregular attacks of high temperature due to detached emboli, (accompanied by rigors) which suddenly fall with excessive sweating (in between the attacks → the patient is normal).
2- Pallor: due to anaemia.
* Signs: (of extension)
1-Tender cord like structure along the side of the neck (extension to Internal Jugular vein).
2-Oedema and tenderness over the posterior border of mastoid process (extension to mastoid emissary vein), It is called Griesenger's sign.
3-Headache, vomiting and blurring of vision with papilloedema (↑ICT due to extension to superior sagittal sinus), it is called Otitic hydrocephalus
4-Proptosis, chemosis, ophthalmoplegia, diminution of vision and oedema of eye lids (extension to cavernous sinus)



Investigations:
- PTA → CHL
- Culture and sensitivity of discharge.
- CT → to show lat. sinus thrombosis (contrast) and to exclude other complications.
- MRA (MR angiography: The most diagnostic).

- Blood picture: a) ↑ WBCs count (leucocytosis)
  b) ↓ RBCs (anaemia)
- Blood culture: +ve if the sample taken during the fever.
- Positive Tobey-Ayer's test:

Lumbar puncture needle connected to pressure manometer, then pressure on IJV of diseased side (thrombosed) → no elevation of CSF pressure. While pressure on IJV of normal side (patent) → elevation of CSF pressure.

Differential Diagnosis:

- Malaria: characterized by
  - Regular attacks.
  - Leucopenia.
  - Parasite in blood film.
- Other intracranial complications.

Treatment:

a) Medical:

- Hospitalization.
- Systemic antibiotics and Antipyretic (for fever).
- Anticoagulant can be given after removal of thrombus or if there is cavernous sinus thrombosis.

b) Surgical: Radical mastoidectomy with removal of thrombus and ligation of IJV.

6 Extradural abscess

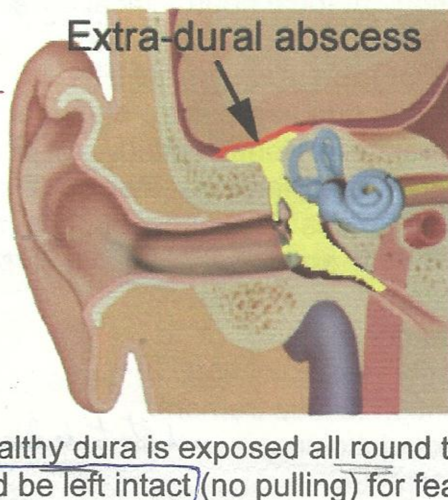
Def.: Collection of pus between the dura and bone (Extra=outside).

Pathology: The dura become covered with granulation tissue.
It is either in middle or posterior cranial fossa.

Clinical Picture: Deafness, tinnitus and discharge (of OM) +

- Asymptomatic: discovered during surgery.
- Ipsilateral headache.
- Low-grade fever.
- Pulsating ear discharge.

N.B.: Differential diagnosis of pulsating ear discharge:
1- ASOM
2- Acute exacerbation of CSOM.
3- Extradural abscess.



Investigations:

- PTA → CHL
- Culture and sensitivity of discharge.
- CT → If suspected.

Treatment:

a) Medical: Systemic antibiotics.

b) Surgical: Drainage of abscess by either.

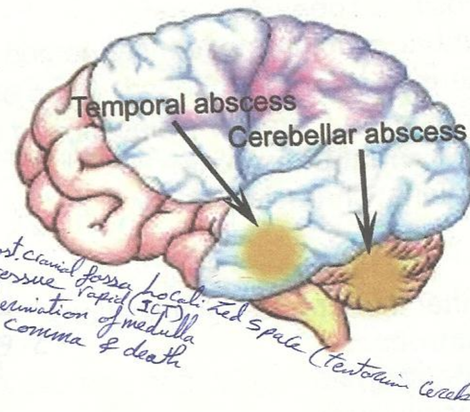
- Cortical mastoidectomy (in mastoiditis)
- Radical mastoidectomy (in cholesteatoma).

N.B.: The bone should be removed until the healthy dura is exposed all round the abscess. The granulations over the dura should be left intact (no pulling) for fear of CSF Leakage and infection.

7 Brain abscess (otitic)

Def.: Accumulation of pus in area of the brain.

Causative organism: Mixed infection
- Gram + ve: Stept, staph.
- Gram - ve: pseudomonas, proteus.
- Anaerobes: bacteroids.



Pathology:

-Sites:
1. - Temporal lobe (more common).
2. - Cerebellum (less common but more dangerous).

- Stages:
  1- Encephalitis: inflammation of brain tissue.
  2- Localization: formation of abscess cavity surrounded by glial capsule.
  3- Enlargement.
  4- Terminal stage: either rupture of the abscess into CSF space → Meningitis, or enlargement to cause herniation of the medulla and death.

Clinical picture: Deafness, tinnitus and discharge (of OM) + According to the stage of infection.

A) Encephalitis:
- Symptoms: - Fever, headache and malaise.
- Signs: - ↑ temperature and rapid pulse.

B) Localization: Latent stage, there may be low-grade fever.

C) Enlargement: Manifest stage

1-Manifestations of ↑ I.C.T.:
- * Headache: Severe and persistent.
- * Vomiting: projectile.
- * Blurring of vision.
- * Papilloedema.
- * ↓Temperature, ↓Pulse and ↓Respiratory rate (failure of vital centers).

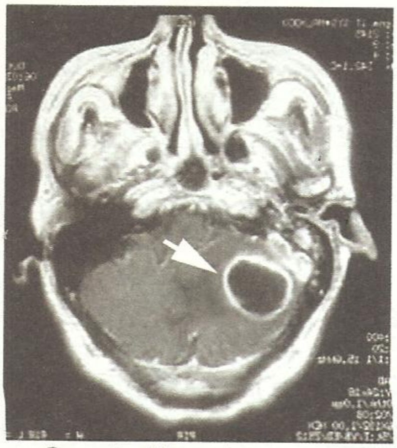
2-Manifestations of focal neurological defects: caused by pressure of the abscess on the surrounding area (according to its site).

***Temporal lobe abscess**: AHHH
- **A**phasia: due to pressure on speech area (in dominant hemisphere).
- Contralateral **H**emiplegia (Motor area).
- Contralateral **H**emianaesthesia (Sensory area).
- Homonymous **H**emianopia (Optic radiation).

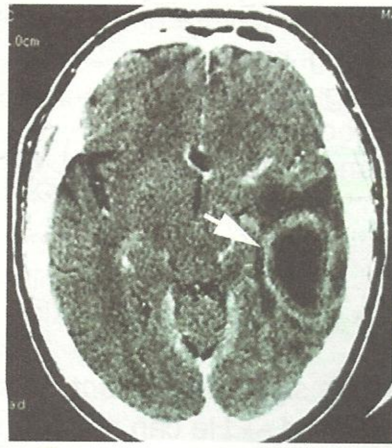
***Cerebellar abscess**: AHMID + Nystagmus + staccato speech.
- **A**taxia.
- **H**ypotonia.
- **M**uscle incoordination.
- **I**ntention kinetic tremors.
- **D**ysdiadokokinesia.
- **N**ystagmus.
- **S**taccato speech.

D) Terminal: due to herniation or rupture of abscess lead to coma and death.

Investigations:
- CT: -Detect site and size of abscess.
  -Follow-up.
- MRI



Cerebellar abscess



Temporal lobe abscess

Treatment:

a) Medical

- Hospitalization.
- Systemic antibiotics: Those cross the Blood Brain Barrier as:
  * Sulphonamide I.V. drips.
  * Chloramphenicol I.V. or I.M.
  * 3rd or 4th generation Cephalosporin I.V. or I.M.
  * Metronidazole I.V. drips.
- Supportive measures:
  * Adequate feeding, fluids and electrolytes.
  * Care of comatosed patient:
    . Frequent repositioning (↓ bed sore).
    . Massage of calf muscles (↓ DVT).
    . Care of respiration (↓ pneumonia).
- Dehydrating measure (to ↓ ICT): by one or more of the followings
  * Mannitol 20% I.V. drip.
  * Lasix I.V.
  * Glucose 25% I.V. drip.
  * Steroids (to decrease brain oedema).
  * Repeated lumbar puncture.

b) Surgical:

- Management of abscess by:
  * Aspiration through burr hole (trephine) in cases of acute abscess.
  * Excision through craniotomy in cases of chronic abscess (thick wall).
- Management of CSOM: Radical Mastoidectomy 2 weeks after recovery of abscess).

9 Meningitis

Def.: Inflammation of meninges (pia + arachnoid) and CSF (subarachnoid space).

Pathology: 2 stages

1- Serous: accumulation of serous fluid in the subarachnoid space.

2- Suppurative: accumulation of pus in the subarachnoid space.

Clinical picture: Deafness, tinnitus and discharge (of OM) +

- Manifestations of infection:

Symptoms: Fever - Headache.

Signs: ↑ Temperature - Rapid pulse.

- Manifestations of ↑ I.C.T.:

Symptoms: -Headache: severe and persistent.
-Vomiting: projectile.
-Blurring of vision.

Signs: -Papilloedema.

- Manifestations of meningeal irritation:

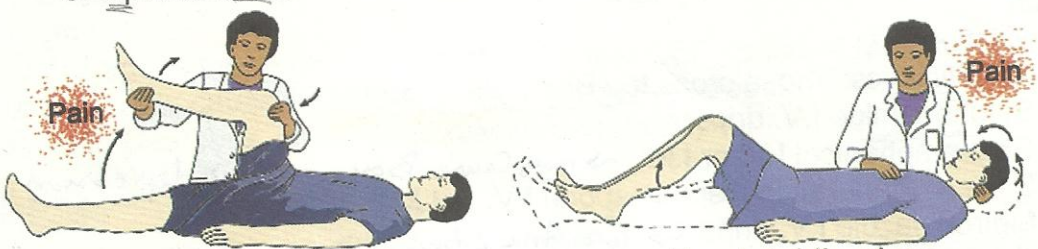
Symptoms:

- Restlessness.
- Photophobia.
- Neck rigidity and neck flexion become painful.

Signs:

-Kernig's sign: The patient is asked to lie in the supine position, with hip and knee flexed → He can not do extension (it becomes painful).

-Brudzinski's sign: Flexion of the neck will be accompanied with reflex flexion of hip and knee.



Kernig's sign — Brudzinki's sign

Investigations:

- CT → to exclude Brain abscess.
- Lumbar puncture: to take CSF for analysis, it should be done slowly in recumbant position.

CSF	Meningitis	Normal
Appearance	Turbid	Clear
Pressure	More than 150 mmH_2O	150 mm H_2O
Cells	Polymorphs	Lymphocytes = 1-5/HPF
Organisms	Present	Absent
Proteins	More than 40mg%	About 40 mg%
Surgar	Less than 80mg%	About 80mg%
Chloride	Less than 750mg%	About 750mg%

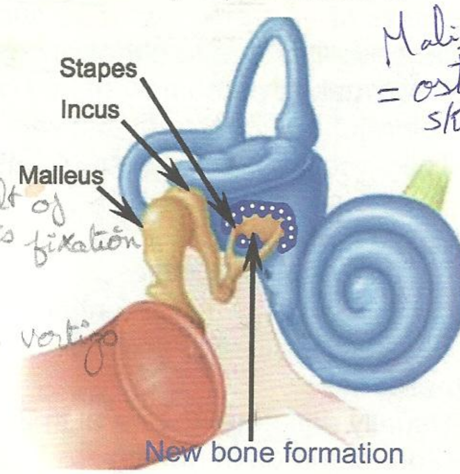
Treatment:

a) Medical: the same as brain abscess with nursing of the patient in quite semi dark room (Photophobia).

b) Surgical: treatment of the cause by radical mastoidectomy for cholesteatoma after improvement of the general condition.

Otosclerosis

Def.: Hereditary localized disease of the otic capsule characterized by replacement of normal compact bone by spongy bone (Otospongiosis) of increased cellularity, vascularity and thickness.



Causes: Unknown but may be Hereditary

Types:

1-Stapedial: around footplate of the stapes leading to its fixation (ankylosis) and CHL

2-Cochlear (rare): in the cochlea leading to SNHL and Vertigo.

3-Mixed: Both.

Incidence:

- More common in females.
- Middle age

Clinical picture:

* Symptoms:

- Deafness: usually bilateral, associated with paracusis willicii phenomenon (i.e. Hearing is better in noisy places).
- Tinnitus.
- Vertigo (rare): in cochlear and mixed otosclerosis.

* Signs:

- Otoscopy: normal in most cases, sometimes (rare) the drum may be flamingo-red in colour in the active stage (Schwartz sign).
- Tuning Fork Tests: CHL in stapedial type or SNHL in cochlear type.

Investigations:

- PTA: CHL, SNHL, or Mixed HL.
- Tympanometry: As curve [normal (A) but stunted (s) curve].
- Acoustic (stapedial) reflex: no response.

Differential Diagnosis:

1- Osteogenesis imperfecta: C.H.L., blue sclera, and multiple fractures.

2- Causes of CHL with intact drum: Secretory OM, Adhesive OM, congenital stapedial fixation or tympanosclerosis.

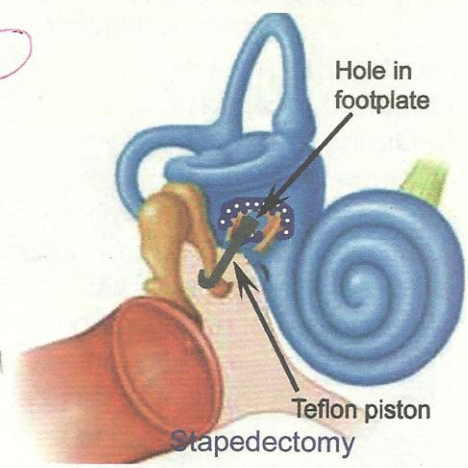
Treatment:

- No treatment:

If the air-bone gap (PTA) is less than 20dB.

- Surgical treatment:

Stapedectomy, it is treatment of choice, removal of stapes and replacement with teflon piston or wire and fat (see operation).

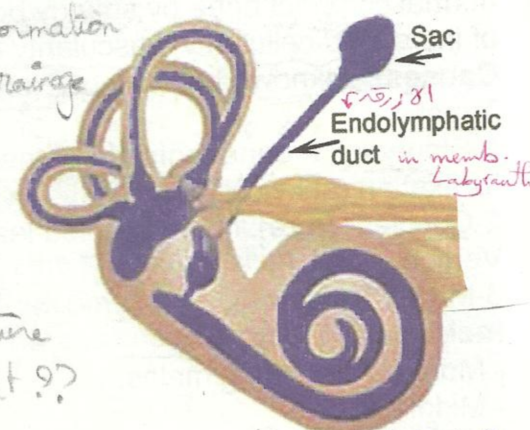


Stapedectomy

- Medical treatment: Sodium fluoride, used if
    - The operation is contra-indicated.
    - SNHL (Cochlear type).
    - +ve Schwartz sign (↑ Vascularity).
- Hearing aid: in severe SNHL.

Meniere's Disease (Endolymphatic hydrops)

Def.: Distension of the membranous labyrinth with endolymph, characterized by recurrent attacks of ***vertigo***, ***deafness*** and ***tinnitus***.



Normal membranous labyrinth

Causes: It is due to either excessive formation of endolymph (by stria vascularis) or lack of its drainage (by endolymphatic sac).

-The exact cause is unknown but may be:

1-Autoimmune.
2-Viral infection.
3-Allergy.
4-Salt and water retention.
5-Sympathetic overtone.

Incidence:

-Usually unilateral (bilateral in 25%).
-More common in males.
-Around the age of 50.

Clinical Picture: Recurrent attacks of the following triad:

- Vertigo:
  . Lasts few minutes to few hours.
  . In between the attacks → the patient is normal.
  . Associated with nausea, vomiting and nystagmus.
- Deafness: SNHL (low tone), which is flactuant, associated with hypersensitivity to loud sound (+ve Recruitment)
- Tinnitus.


Meniere's disease:
Distended membranous labyrinth

Investigations:

1- Audiological:
- PTA (fluctuant SNHL, low tone)
- Electrocochleography.
- Glycerol test → +ve (Glycerol is diuretic) Hearing will be better after intake of glycerol.

2- Vestibular → Caloric test (Hypofunction).

3- Radiological → CT:
- To exclude tumour (as a cause of vertigo).
- May show narrow vestibular aqueduct (endolymphatic canal).

Treatment:

- Medical treatment:

A- During the attack:
- Complete bed rest.
- Sedatives as Diazepam.
- Antiemetics as chlorpromazine.

B- In between the attacks:
- Psychological reassurance.
- Salt and water restriction.
- Diuretics as frusemide (lasix)
- Vasodilator: Betahistidine
-Antivertigo drugs: as Dramamine.
-Streptomycine (medical labyrinthectomy): in toxic doses (in bilateral severe SNHL).



- Surgical treatment:
- If hearing is bad → Surgical labyrinthectomy.
- If hearing is good → Endolymphatic sac decompression —if failed→ Vestibular neurectomy

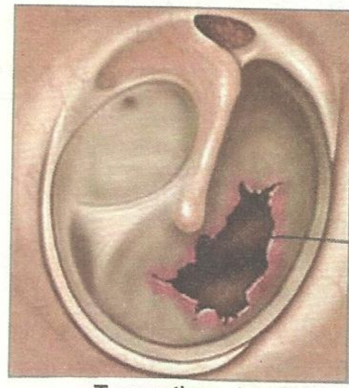
Ear trauma

Traumatic rupture of the drum

Aetiology:

1- Indirect trauma:
- Slap: Trauma to ear by the palm of the hand.
- Otitic barotrauma.
- Blast injury (explosion).

2- Direct trauma:
- Self inflected.
- Iatrogenic: during ear wash or removal of FB.
- Fracture base of the skull.



Traumatic rupture

Clinical picture:

* Symptoms: History of trauma with:
- Pain: at the time of rupture.
- Deafness and tinnitus.
- Bleeding: slight (except in fracture base).
- Whistling sound on blowing of the nose.

* Signs:
- Otoscopy:
- EAC: may show blood clots
- Drum: shows perforation, which is: central in the pars tensa has thin irregular edge surrounded by blood clots.
- Tuning Fork tests: CHL



Pathological perforation

Differential diagnosis: from pathological perforation:

	Traumatic	Pathological
* History	Trauma	Otitis media
* Discharge	Absent	Present
* Bleeding	Present	Sometimes present.
* Perforation		
Type	Central	Central, marginal or attic
Size	Small	Any size
Site	Pars tensa	Any where
Shape	Irregular	Regular
Edge	Thin surrounded by clot	Thick and not surrounded by clot.
* ME Mucosa	Normal	Congested.

N.B. When traumatic perforation become infected, it is very difficult to differentiate.

Treatment:

A- Medical (conservative):

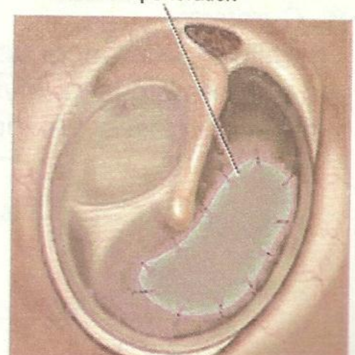
Avoid 2: Wetting of ear (i.e. keep it dry).
Blowing of nose.

Give 2: Systemic antibiotics.
Decongestant nasal drops.

N.B.: Healing usually in about one month (except if infected).

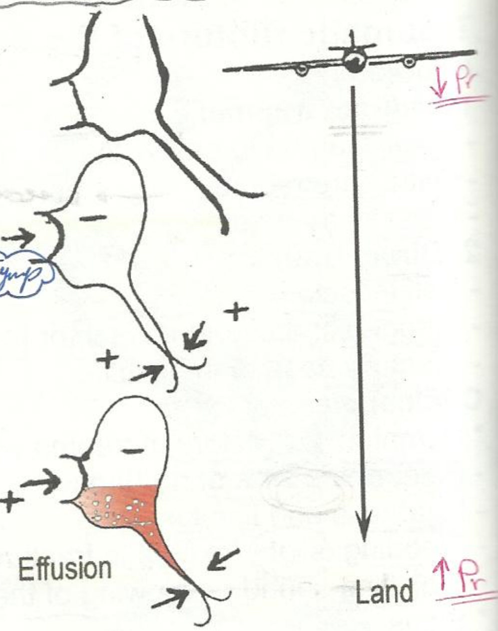
B- Surgical: Myringoplasty indicated after failure of medical treatment (3-6 months).

Temporalis fascia graft under the perforation



Otitic barotrauma

Def.: Trauma to the middle ear caused by atmospheric pressure changes in relation to the middle ear pressure.



Predisposing factors:

ET obstruction by:

- Allergic rhinitis, polyp.
- Common cold.
- Deviated septum.
- Adenoid.

Mechanism:

-Normally the ET allows air to enter ME to equalize pressure on both sides of the drum.

-When the ET becomes closed, the drum will retracted (-ve pressure in ME) → in mild cases.

-During rapid descent of the aeroplane, the atmospheric pressure increases and the ME pressure decreases (relative to atmospheric pressure) leading to ME effusion and sometimes bleeding inside the ME (Hemotympanum) → in moderate cases.

-When the ME pressure become severely decreased, it will lead to rupture of the drum → in severe cases.

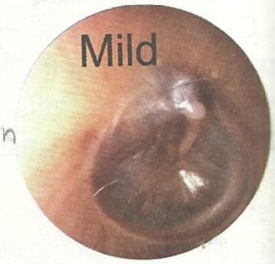
Clinical picture:

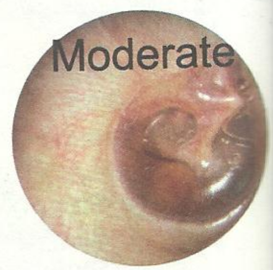
Symptoms:

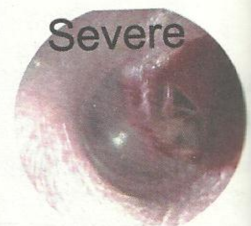
- Deafness and tinnitus.
- Pain in the ear.
- Sensation of ear fullness.

Signs: according to the stage.

- ***Otoscopy:***
- Mild cases. .... Retracted drum.
- Moderate cases........ Effusion in ME.
- Severe cases .... Rupture of the drum.
- ***Tuning Fork:*** CHL.







Treatment:

A-*Prophylactic*:

Avoid 2: Flying with nasal obstruction.
Sleep during flying.

Give 2: Decongestant nasal drops for nasal obstruction before fly.
Chewing gum.

B- *Curative*:

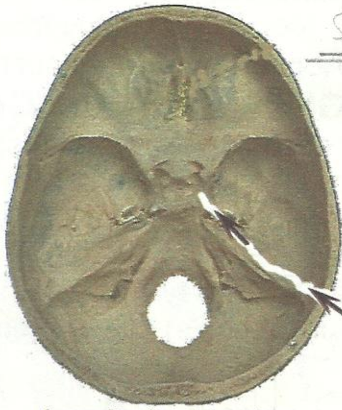
- In mild cases: Decongestant nasal drops + Valsalva's maneuver.
- In moderate cases: Myringotomy and drainage.
- In severe cases : Myringoplasty if no healing within 3 - 6 months.

Fracture base of the skull (Temporal bone)

A) Longitudinal fracture:

Incidence: More common (80%) but less dangerous.

Aetiology: Trauma to the side of the head → fracture line passing along the longitudinal axis of petrous bone, through the roof of EAC (lacerations), Drum (rupture) and ossicles (dislocation).



Longitudinal fracture

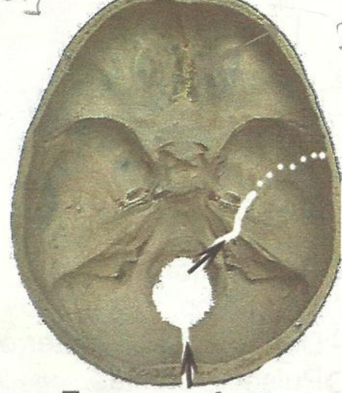
Clinical picture:

- -CHL due to rupture of the drum and dislocation of ossicles.
- -Bleeding per ear (lacerations).
- -Otoscopy: rupture of the drum and lacerations in EAC.
- -Facial paralysis: (rare-20%), it is usually partial and delayed due to compression of the nerve by oedema or haematoma.

B) Transverse type:

Incidence: Less common (20%) but more dangerous.

Aetiology: Trauma to the back of the head → fracture line passing perpendicular to the longitudinal axis of petrous bone, through the inner ear and facial canal (paralysis).



Transverse fracture

Clinical picture:

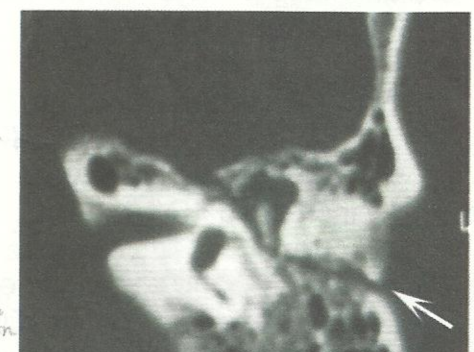
- -SNHL and vertigo: due to injury of the inner ear.
- -Hemotympanum: i.e. bleeding in ME with intact drum.
- -Otoscopy: the drum is reddish or bluish in colour.
- -Facial paralysis: (common-50%) it is usually immediate and complete due to injury (cut) of the nerve.

Investigations:

- -CT → to detect fracture (bone).
- -MRI → to exclude brain injury (soft tissue).

Treatment:

- -Hospitalization under complete aseptic condition.
- -Systemic antibiotics: Those cross Blood Brain Barrier to prevent infection.
- -Steroids: to decrease any brain oedema.
- -Surgical management:
  - a) Of brain injury by neurosurgeon.
  - b) Of ruptured drum by Myringoplasty.
  - c) Of dislocated ossicles by ossiculoplasty.
  - d) Of facial nerve injury.



CT:
Longitudinal fracture passing through ME

Trauma to the inner ear

1- Physical:

- Acute: exposure to explosion.
- Chronic: prolonged exposure to loud sound.

2- Mechanical:

- Surgical: perilymph fistula due to stapedectomy or mastoidectomy.
- Accidental: transverse skull base fracture.

Clinical picture: SNHL and vertigo.

Treatment:
- -Conservative:
  - Complete bed rest in semisitting position.
  - Avoid coughing and straining.
  - Antibiotics in mechanical trauma.
- -Surgical closure of perilymph fistula with temporalis fascia graft
- -Hearing aid: for SNHL.

Tumours of the ear

Middle ear: - Glomus
- Carcinoma

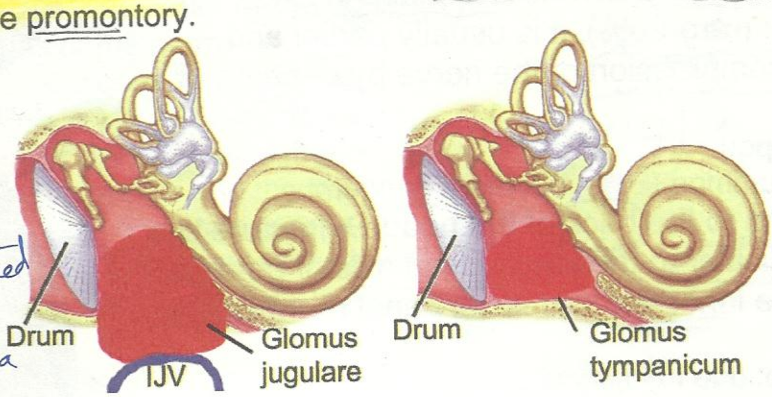
Acoustic nerve: Acoustic neuroma

1 Glomus tumour (Chemodectoma - Paraganglioma)

A benign, locally aggressive, highly vascular tumour arises from paraganglionic tissue related to certain nerves in temporal bone.

1-Glomus jugulare: arises in relation to auricular branch of vagus (Arnold's) at the jugular bulb.

2-Glomus tympanicum: arises in relation to tympanic plexus of glossopharyngeal (Jacobson's) on the promontory.



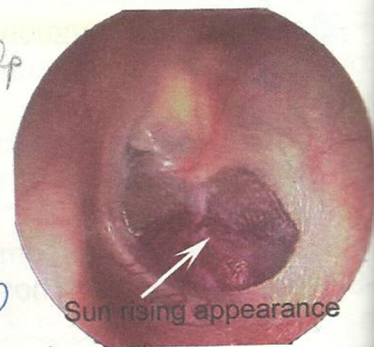
Clinical picture:

*Symptoms:
- Deafness: CHL later on → MHL
- Pulsatile tinnitus.

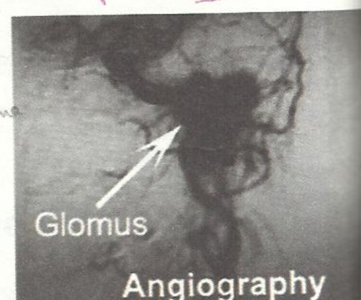
*Signs: Sun rising appearance which blanch on siegalization (Brown's sign).

*Cranial nerve paralysis. (Extension)
- 7th → facial palsy.
- 9th → chocking.
- 10th → Hoarseness.
- 11th → Shoulder drop.
- 12th → Tongue paralysis.

*Finally increased I.C.T.



Investigation:
- -CT: shows the bone better (wide Jugular foramen).
- -MRI: shows soft tissue better (Tumour mass).
- -Angiography: shows the feeding vessel and to do embolization (feeding vessel = Ascending pharyngeal artery).



N.B: Biopsy is contraindicated............Bleeding.

Treatment: Surgical excision with pre-operative embolization to decrease bleeding.

2 Squamous cell carcinoma of middle ear

* **Age:** More in old (above 60 years).
* **Sex:** more in males.
* **Predisposing factors:** - Long standing CSOM.
  - Irradiation.
* **Clinical Picture:**

Symptoms: Long standing CSOM with change of the characters:

"Hold my hands in bet. yours"

- Pain. - Bleeding.
- Facial palsy. - ↑ Hearing loss.

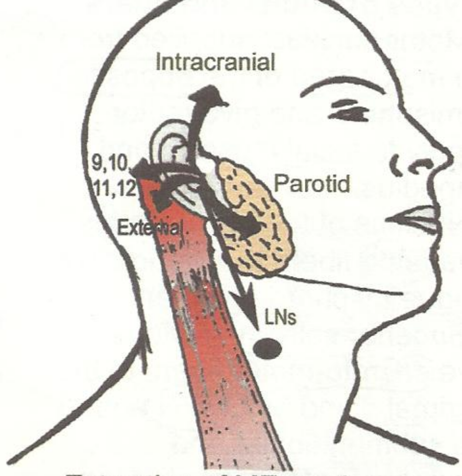
Signs: irregular mass which bleeds on touch and may extend to surrounding structures.

* **Investigations:**

- CT → show bone better (bone erosion).
- MRI → shows soft tissue better (tumour mass).
- Biopsy * → Carcinoma biopsy
- Metastatic work up
- Routine pre-operative investigation. e.g. [CBC, Liver function

* **Treatment: 3R**

Radical mastoidectomy
\+ Radical neck dissection if LNs enlargement * in Larynx in details
\+ Radiotherapy.



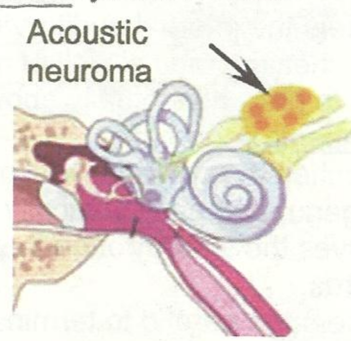
Extension of ME carcinoma

> **NB. D.D. of blue drum:**
> 1- Hemotympanum.
> 2- High Jugular bulb.
> 3- Carotid aneurysm (ICA).
> 4- Glue ear (Secretory Otitis Media).
> 5- Glomus tumour.

3 Acoustic neuroma (Vestibular schwannoma)

A Benign tumour arises from Schwann cells of vestibular nerve.

Site: In the cerebellopontine angle (CPA) at the glial-neurolemmal junction of the vestibular nerve.



Clinical picture:

1- Otological manifestations:
- Deafness: SNHL (unilateral)
- Tinnitus: (unilateral)
- Vertigo: (Rare) → Bec- gradual not sudden bec. benign

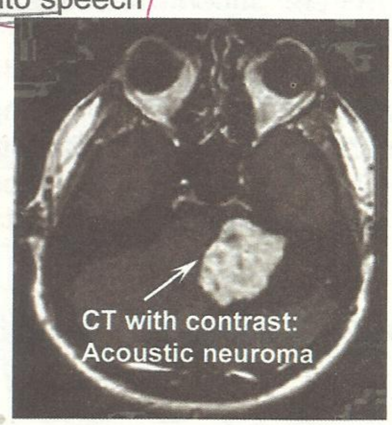
2- Neurological manifestations:
- Trigeminal (5th) → loss of corneal reflex (1st sign)
- Facial (7th) → rare and late.
- 9th, 10th, 11th, 12th → as before.

3- Cerebellar manifestations: Nystagmus, ataxia and staccato speech

4- Terminal: increase ICT.

Investigation

- PTA→ SNHL (Unilateral)
- Speech audiometry → poor speech discrimination.
- ABR → delayed wave V (see audiology).
- CT with contrast → widening of internal auditory meatus
- **MRI** → the best diagnostic investigation, it shows even very small tumour.



CT with contrast: Acoustic neuroma

D.D. of CPA lesions:
- Acoustic Neuroma: the commonest.
- Meningioma.
- Congenital cholesteatoma.
- Arachnoid cyst

Treatment:

- Surgical excision.
- Stereotactic radiosurgery (Gamma knife): in small tumour. → arrest growth of tumour

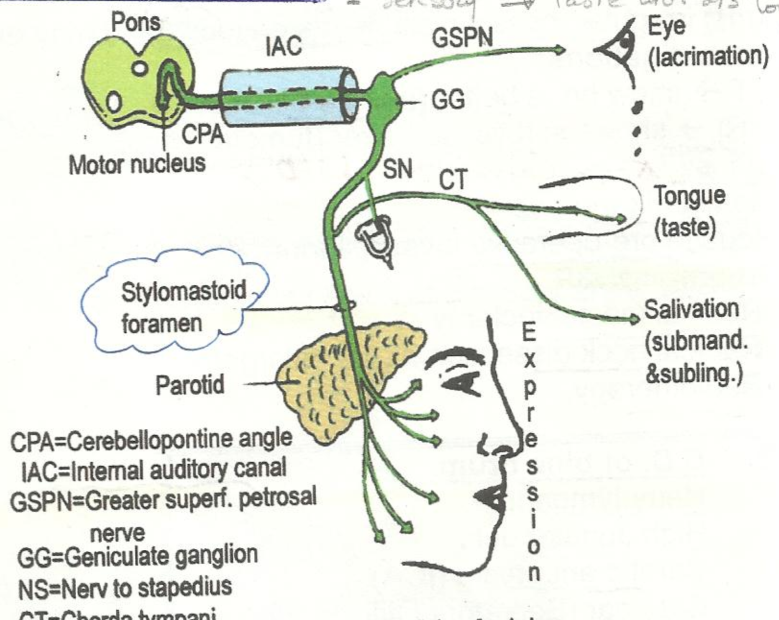
N.B: Acoustic neuroma is usually unilateral but it may be bilateral in cases of multiple neurofibromatosis.

The Facial Nerve

Anatomy:

- **It is the motor nerve of the face.**
- **Types of nuclei and fibers:**

1-Motor nucleus: supplied from the motor area of the opposite hemisphere and give motor supply to facial muscles and stapedius.
2-Nucleus of tractus solitarius: give taste fibers to anterior $^2/_3$ of tongue by chorda tympani.
3-Superior salivary nucleus: give secreto-motor fibers to the lacrimal gland by GSPN and to the submandibular and sublingual salivary glands by chorda tympani.



Anatomy of the facial nerve

- **Course:**

- The facial nucleus present in the pons.
- The fibres pass from the nucleus and turn around the 6th nucleus.
- It leaves the pons at its lower border to the cerebellopontine angle (CPA) accompanied with 8th nerve.
- It enters the internal auditory meatus (with 8th) = Labyrinthine segment (in IAM).
- It reaches the medial wall of middle ear at the geniculate ganglion turns backwards (1st genu) to pass horizontally above the promontory in the fallopian canal (facial bony canal) = Tympanic segment.
- It reaches the posterior wall of middle ear and turns downwards above the oval window (2nd genu) and pass vertically (in post. wall)= Mastoid segment.
- It leaves the skull through the stylomastoid foramen (SMF) passing downwards and forwards.
- It enters the parotid to terminate as 5 branches.

- **Branches:**

1-Greter superficial petrosal nerve (GSPN): from geniculte ganglion, it is secretomotor to lacrimal gland.
2-Nerve to stapedius: supplying the stapedius muscle (from mastoid segment).
3-Chorda tympani: supplying the anterior $^2/_3$ of tongue (taste) and secreto-motor to submandibular and sublingual salivary glands (from mastoid segment).
4-Nerve to stylohyoid and posterior belly of digastric: at SMF.
5-Nerve to occipital belly of occipito frontails: at SMF

6-Five terminal branches within the parotid →
- Temporal
- Zygomatic
- Buccal.
- Mandibular.
- Cervical.



7-Sensory fibers to the posterior part of EAC.

" من الأعماق صرخت إليك يا رب "

Facial nerve paralysis

Aetiology:

A) Upper motor neuron lesion (UMNL): above the level of the nucleus i.e. central
- Traumatic: Head trauma.
- Inflammatory: Meningitis - encephalitis.
- Vascular: Thrombosis - Haemorrhage-Embolism (THE).
- Neoplastic: brain tumour.
- Degenerative: Multiple sclerosis.

B) Lower motor neuron lesion (LMNL): at or below the level of the nucleus.

1- Pontine lesions: i.e. nuclear (as central).

2- CPA lesions: i.e. D.D. of CPA lesions Cerebelo pontine angle
- Acoustic neuroma.
- Meningioma.
- Congenital cholesteatoma. → facial ticks → paralysis
- Arachnoid cyst.

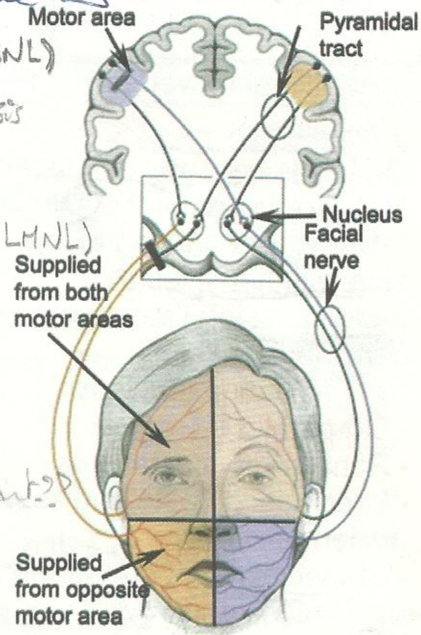
3- Cranial (Otogenic) lesion: i.e. in the temporal bone (TITI)

* Traumatic:
- Surgical: ear operations.
- Accidental: fracture base.

* Inflammatory:- ASOM (in dehiscent facial canal).
- CSOM (in cholesteatoma eroding facial canal).
- Malignant Otitis Externa. facial palsy
- Ramsay Hunt syndrome. (7th & 8th) * Causes of facial N Paralysis in its Cranial part??

* Tumour:
- Glomus.
- Sq. cell carcinoma.
- Acoustic neuroma.

* Idiopathic: Bell's plasy (the commonest cause).



4- Extracranial (TIT): Parotid

* Traumatic:
- Surgical → parotid surgery.
- Accidental → stab in parotid.

* Inflammatory: Sarcoidosis.

* Tumour: parotid tumour. [Compression]

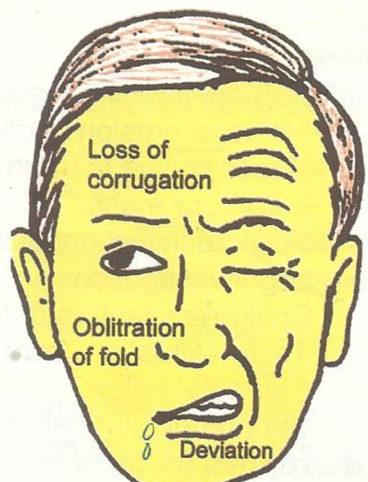
5- Miscellaneous:
- Peripheral neuritis. → as in DM
- Guilliane- Barre syndrome: ascending polyneuritis.
- Milkersson Rosenthal syndrome: 4F
  - Facio-labial oedema
  - Fissured tongue
  - Facial palsy (Recurrent)
  - Familial

Clinical picture: of LMNL

Symptoms:
- Inability to close the eye (on affected side)
- Deviation of mouth (to the healthy side)
- Accumulation of food behind cheek (on affected side).

Signs:

* Inspection:
- Loss of corrugation of forehead (on affected side).
- Obliteration of nasolabial fold (on affected side).
- Dripping saliva on Affected side



Rt facial paralysis

Hemiplegia = total paralysis of arm + leg + trunk on same side of body

- Deviation of Mouth (to healthy side).
- Drippling of saliva (on affected side).

* Motor power:
- Inability to elevate eye brow (Frontalis).
- Inability to close the eye (orbicularis oculi).
- Inability to whistle and to blow (Buccinator and orbicularis oris).
- Inability to show the teeth (Retractor anguli).

N.B.: Difference between UMNL and LMNL:

	UMNL	LMNL
- Site of paralysis	✻Lower $^1/_2$ of face (Opposite side).	Upper $^1/_2$ + Lower $^1/_2$ of face (same side) i.e. total facial paralysis.
- Emotional movement	Present	Absent
- Hemiplegia	Present	Absent

✻This is because the upper $^1/_2$ of the face is bilaterally represented.

N.B.: Detection of the level of paralysis:

1-UMNL → paralysis of lower 1/2 of face on the opposite side with hemiplegia.

2-LMNL → total facial paralysis on the same side without hemiplegia with:

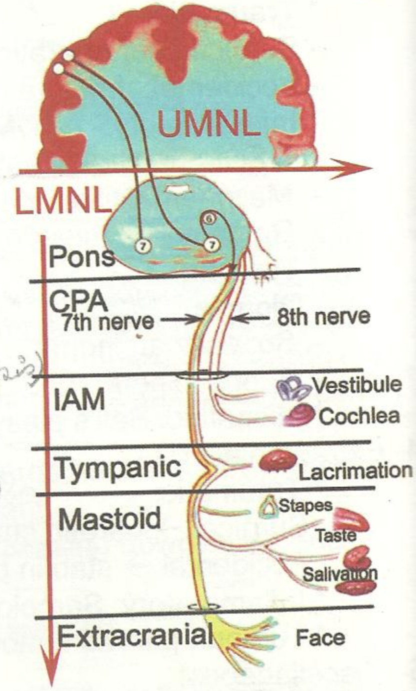
a) Pontine (nuclear):
- 6th paralysis (squint).
- Pontine manifestations.
- Lacrimation, taste and salivation are normal (other nuclei).
- Stapedial reflex is lost (the same motor nucleus). (otosclerosis)

b) CPA and IAM:
- 8th paralysis (SNHL+vertigo).
- Lacrimation, taste, salivation and stapedial reflex are lost (nerve fibres).

c) Geniculate ganglion: Lacrimation, taste, salivation and stapedial reflex are lost.

d) Below the Geniculate:
- Lacrimation is normal.
- Taste, salivation and stapedial reflex are lost.

e) Extacranial: lacrimation, taste, salivation and stapedial reflex are normal.



Investigations:

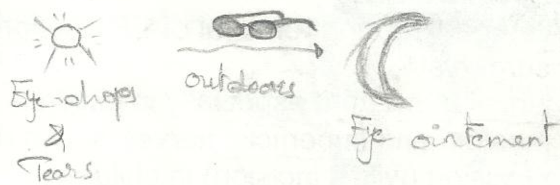
- **Radiological** investigations:
  X-ray → Bone erosion in cholesteatoma.
  CT → Fracture line in trauma.
  MRI → Tumour mass.
- **Audiological** investigations: PTA → if there is associated ear lesion.
- **Leveling** investigations:
  - Schirmer's test: to detect lacrimation.
  - Taste sensation: from anterior $^2/_3$ of tongue
  - Stapedial reflex.
  - Submandibular salivary flow test.
- **Electrophysiological tests:** to detect degeneration early

(a) Nerve excitability test (NET): If the difference between both sides exceeds 3 mAmp. → Bad prognosis. (The muscle contraction is seen by the eye)
(b) Electroneurography (ENOG): The same as above but the muscle contraction is detected on a graph.
N.B.: NET and ENOG are of no value in the first 3 days of paralysis.
(c) Electromyography (EMG): Normally, stimulation of a muscle lead to its contraction (Action potentials). If the muscle is degenerated → fibrillation potentials.
N.B.: If the muscle is reinnervated → polyphasic potentials (2 months before clinical recovery).
N.B.: EMG is of no value in the first 3 weeks of paralysis.
N.B.: NET and ENOG → Stimulation of the nerve and detection of muscle contraction.

Results of facial paralysis:
1-Contracture: fibrosis of muscles.
2-Cross innervations: due to disarrangement of the regenerating fibres lead to:
(a) Crocodile tears: Lacrimation during eating.
(b) Synkinesis: voluntary movement of a muscle will be accompanied with involuntary movement of another muscle.

Pathology of facial nerve injury:
- **Neuropraxia:** Just compression of the nerve (Reversible conduction block).
- **Axonotemesis:** interruption of the axon with still intact end-neurium.
- **Neurotemesis:** interruption of the axon and endo-neurium.

Management of facial paralysis (General):
1- Psychological reassurance: especially in cases of Bell's palsy.
2- Care of the eye to prevent keratitis:
- Eye drops and artificial tears by day.
- Dark glasses in outdoors.
- Eye ointment by night.
- Lateral tarsorraphy in prolonged cases.



3- Care of facial muscles:
- Massage of facial muscles.
- Physiotherapy.
- Facial exercise when the movements start to reappear.
4- Treatment of the cause.
5- Rehabilitation:
(a) Dynamic: The muscles are still viable.
- End-to-End anastomosis: if there is narrow gap.
- Nerve graft: if there is wide gap. The graft taken from greater auricular or sural nerve.
- Hypoglosso-facial anastomosis.
(b) Static: the muscles are fibrosed i.e. cosmetic:
- Temporalis muscle transposition.

Idiopathic facial paralysis (Bell's palsy)

- It is the commonest cause (90%).
- **Aetiology:** unknown but different theories.

- Vascular theory: Exposure to cold air draughts → spasm of vasa nervosa → ischaemia of the nerve → oedema (due to metabolite accumulation) and compression of the nerve in its canal.

- Viral theory: Herpes simplex without vesicles.
- Auto immune.

♦ **Clinical picture:**

LMNL (sudden) + pain before paralysis by hours + Red chorda tympani can be seen through the drum.

- Diagnosed by exclusion of all other causes.
- LMNL (symptoms + signs), which is of sudden onset, partial or complete.
- Pain behind the ear: hours before paralysis.
- Red chorda tympani nerve: seen through the drum.

♦ **Investigations:** as discussed before.

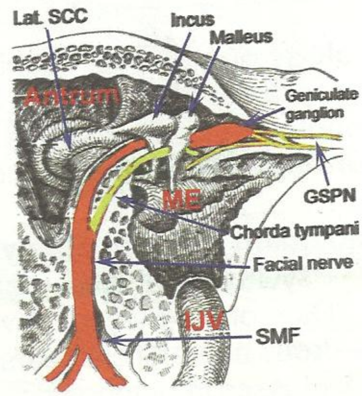
N.B.: If there is no recovery within 6 months, we should do MRI to exclude any tumour.

♦ **Treatment:** General + Steroids (↓oedema) + V.D (↓ spasm)

- General: Reassurance, Care of the eye, Care of facial muscles.
- Medical:
(a) Steroids: 60-80mg/day decreased gradually, it is called medical decompression (to decrease oedema).
(b) Vasodilators as betahistidine in the first few hours (↓ spasm). (Meniere's disease)
- Surgical: Decompression of facial nerve by deroofing of the facial canal with slitting of nerve sheath (↓ oedema). It is indicated if the degeneration is more than 90% within 2 weeks (By ENOG).

♦ **Prognosis:** bad if there is:

- Diabetes, Hypertension and old age.
- Recurrent Bell's palsy.
- The pain behind the ear was severe.
- Complete paralysis from the start.



Traumatic Facial Paralysis

♦ **Types:**

(A) Surgical trauma:

1- CPA surgery: during removal of CPA lesions.

2- Ear surgery:

-Post auricular incision: especially in children (small mastoid and superficial nerve), so we do high oblique incision (wild's incision) in children.

-Cortical mastoidectomy.

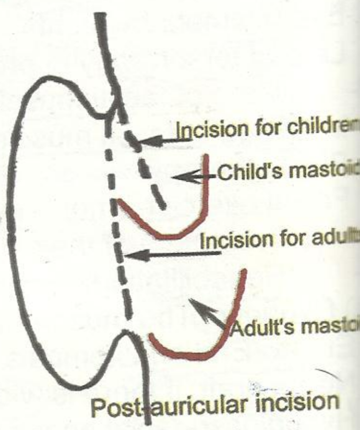
-Tympanoplasty.

-Radical mastoidectomy. → done for management of otosclerosis

-Stapedectomy (if the facial canal is dehiscent).

N.B.: Commonest site to be injured is the 2nd genu.

3- Parotid surgery: during removal of parotid tumour.



(B) Accidental trauma: Fracture base of the skull.

1- Longitudinal: The paralysis is partial and delayed (due to stretch or compression of the nerve by oedema). (Mild)
Associated with CHL.

2- Transverse: The paralysis is complete and immediate (due to cutting of the nerve). (Severe)
Associated with SNHL and vertigo.

♦ **Investigations:** CT → to detect fracture line.

♦ **Treatment:**

(a) If the paralysis is immediate and complete:
Immediate exploration with reanastomosis (narrow gap), or grafting (wide gap).

(b) If the paralysis is delayed and partial:
Conservative treatment (antibiotics + steroids), but if there is no improvement within 2 weeks → Surgical exploration.

Symptomatology

Deafness

Def.: Diminution of hearing.

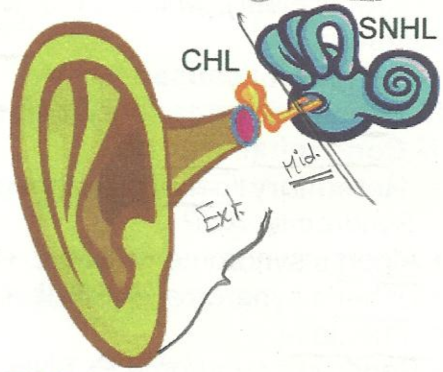
Types:

1-Conductive Hearing Loss (CHL): lesions in External or middle ear.

2-Sensorineural Hearing Loss (SNHL): lesions in inner ear, cochlear nerve or the central connection.

3-Mixed Hearing Loss (MHL): Lesions causing CHL and SNHL.

4-Psychogenic Hearing Loss (Hysterical).



Conductive Hearing Loss (CHL)

Def.: Deafness due to lesions in the external and/or middle ear (↓ conduction).

Causes:

(A) Causes in EAC:

1- Congenital: Meatal atresia.

2- Traumatic: F.B.

3- Inflammatory: Otitis Externa with oedema and obstruction of EAC.

4- Neoplastic: exostosis (osteoma) or carcinoma.

5- Miscellaneous: wax.

(B) Causes in the drum:

1- Traumatic rupture.

2- Bullous myringitis.

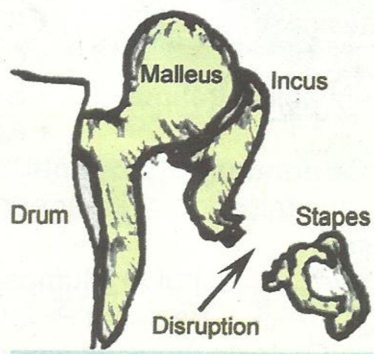
(C) Causes in the Middle ear cavity:

1- Congenital: atresia or stapedial fixation.

2- Traumatic: Fracture base of skull (longitudinal type).

3- Inflammatory: Otitis Media (O.M.) which may be:

- a- ASOM.
- b- Chronic non-suppurative OM:
  - Secretory OM.
  - Adhesive OM.
  - Tympanosclerosis.
- c- Chronic suppurative OM:
  - Safe (tubotympanic) type.
  - Unsafe (Attico-antral) type i.e. cholesteatoma.



N.B.: Traumatic disruption of ossicles leads to CHL (> 40 dB) treatment by ossiculoplasty.

4- Neoplastic:

- a- Glomus tumour.
- b- Sq. cell carcinoma.

5- Miscellaneous: Otosclerosis.

(D) Causes in Eustachian tube:

1- Congenital: Cleft palate.

2- Traumatic: Otitic barotrauma.

3- Inflammatory: ET catarrh in common cold.

4- Neoplastic: Carcinoma of nasopharynx → unilateral secretory OM.

5- Miscellaneous: Adenoid.

N.B. The commonest cause of CHL is wax accumulation.

Sensorineural Hearing Loss (SNHL)

Def.: Deafness due to lesion in the inner ear (Cochlea) and/or its central connection (Retrocochlear), which is the nerve and the auditory center.

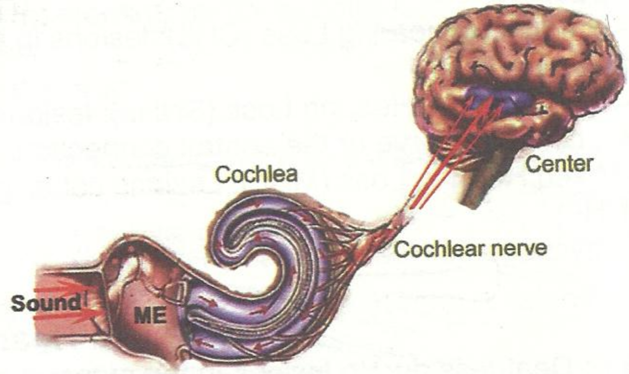
Causes:

I - Peripheral causes:

(A) Cochlear (inner ear) lesions:

1- Congenital: may be

- **Hereditary**: genetic factors
- Syndromic: AUP
  - Alport's syndrome → SNHL +Nephritis.
  - Usher's syndrome → SNHL + Retinitis pigmentosa.
  - Pendred's syndrome → SNHL+ Goiter.
- Non-syndromic:
  - Mondini's disease → The cochlea is single turn



- **Acquired**: external factors
- Prenatal: Rubella
  Ototoxic drugs during pregnancy.
- Natal: Birth trauma.
  Hypoxia.
- Postnatal: Neonatal jaundice.
  Neonatal infection as meningitis.

2- Traumatic:

a- Physical trauma:
- Acute acoustic trauma: as explosion.
- Chronic acoustic trauma: prolonged exposure to noise.

b- Mechanical trauma:
- Surgical: Perilymph fistula.
- Accidental: Fracture base (Transverse type).

3- Inflammatory: Labyrinthitis

Def.: inflammation of inner ear (labyrinth).

Causes:

Infective
- Viral → Mumps-Measles.
- Bacterial → 2ry to otitis media or meningitis or syphilis.

Toxic: Ototoxic drugs as aminoglycosides, diuretics, salicylates, quinine and chemotherapy.

4- Vascular: thrombosis of internal auditory artery.

5- Miscellaneous:

a- Meniere's disease.

b- Senile deafness (presbyacusis): Deafness in old age, due to degeneration of the organ of Corti and/or cochlear nerve fibers.

c- Cochlear otosclerosis: rare.

(B) Cochlear nerve lesions: compression in CPA by
- Acoustic neuroma.
- Meningioma.
- Congenital cholesteatoma.

II- Central lesions:

a- Traumatic: Head trauma.

b- Inflammatory: Meningitis and encephalitis.

c- Neoplastic: Brain tumour.

d- Vascular: THE (**T**hrombosis-**H**aemorrhage-**E**mbolism).

e- Degenerative: Multiple sclerosis (MS).

N.B.: Sudden SNHL may occur in traumatic, vascular or autoimmune diseases.

N.B.: The commonest cause of SNHL is presbyacusis.

" لا تقل اي ولد "
+

Mixed Hearing Loss (MHL)

Def.: CHL + SNHL

Causes:

1- **Congenital meatal atresia with inner ear anomaly.**
2- **Complicated CSOM with labyrinthitis.** [CHL + SNHL respectively]
3- **Combined otosclerosis.** [Stapedial + Cochlear]

Psychogenic (Hysterical) Hearing Loss

-Occurs in persons with hysterical personality.
-There is no organic cause in the ear.
-There is marked difference between the results of PTA and speech audiometry.
-Treatment: psychotherapy.

Deafness in Children (Deaf-Mutism)

• No good hearing in childhood (Deafness) = No speech (Mutism) especially in the first 3 years of life.



• **Causes:**

(A) Congenital causes: as before.
(B) Acquired causes:
- Infection: as Meningitis, Mumps and Measles (the commonest causes of Deaf-Mutism).
- Ototoxic drugs in children.

N.B. Recurrent bilateral CHL as due to AOM or SOM may lead to delayed speech development.

• **Assessment of Hearing in Children:**

1- Under 2 years (Distraction Method): The child directs his face to the source of sound. Using either loud sound (e.g. bell) or quite sound (e.g. cup and spoon).
Moro's reflex: The child respond to loud sound by Jerky movement of the body.
2- From 2-5 years (Conditioning method or play audiometry): The child is asked to pick up a toy as a response to sound.
3- Above 5 years: The child can respond to any type of audiometry and hearing tests as adults.
4- At any age (objective tests): see audiology
- Evoked Response Audiometry (ERA). → [in Congenital Meatal Atresia]
- Otoacoustic emissions.

Tinnitus

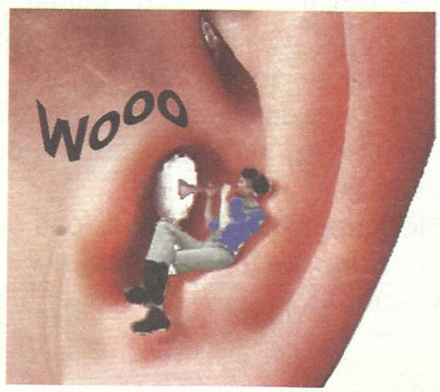
•**Def.:** Sensation of a noise either in the ear or in the head.

•**Causes:**

- Tinnitus with deafness:
-Due to local lesion in the ear.
-Causes of CHL, SNHL and MHL can cause tinnitus.

- Tinnitus without deafness: [→ subjective, → objective]

a- Subjective: (i.e. heard by the patient only).
-TMJ arthritis.
-Impacted wisdom tooth.
-Cervical spondylosis.
-Blood disease: anaemia or polycythaemia.
-Vascular diseases: Hypertension or hypotension.



" انهم ترجعوا وتصيروا كهولاء لن تدخلوا ملكوت السموات "
+

b- Objective: (i.e. heard by the patient and doctor by auscultation).

-Defect in the blood vessels: Vascular tumour (Glomus) } Pulsatile Tinnitus
ICA aneurysm.
High Jugular bulb.

-Defect in the muscles: Palatal myoclonus.
Tympanic myoclonus.

N.B.: Pulsatile tinnitus = Glomus, high jugular bulb or carotid aneurysm.

Ear discharge (otorrhoea)

(A) Watery: CSF otorrhoea

1- Traumatic:
- Surgical → Perilymph fistula.
- Accidental → Fracture base of skull.

2- Neoplastic: Tumours.

(B) Mucopurulent:
- ASOM
- CSOM (Safe type).

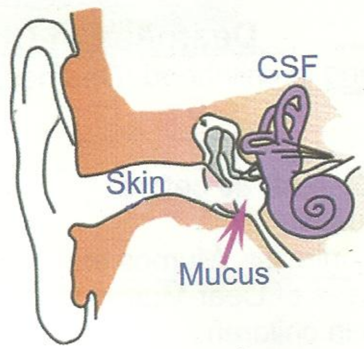
(C) Purulent:
- Otitis externa: Localized and Diffuse.
- CSOM (Unsafe type).

(D) Bloody:

1- Traumatic:
- F.B in EAC.
- Rupture of the drum.
- Fracture base of the skull (longitudinal type).

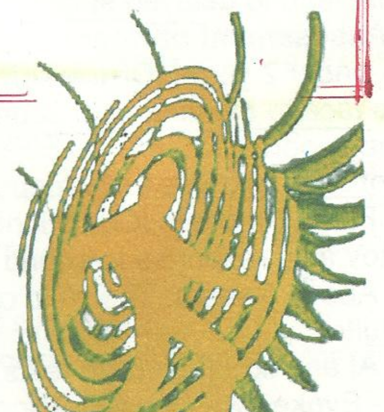
2- Inflammatory: bullous myringitis.

3- Neoplastic:
- Glomus.
- Sq. cell carcinoma.



Vertigo

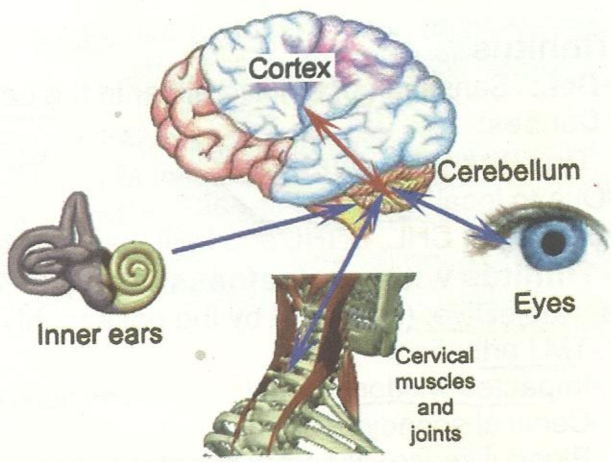
Def.: Hallucination of movement, subjective sense of motion either of the patient or of the surrounding (i.e. false sense of rotation).



The body balance is maintained by inputs to the brain from 3 areas:
- Inner ears (Vestibular part).
- Eyes.
- Proprioceptive organs (especially the neck).

The diagnosis of the cause of vertigo depends mostly on history much on examination and little on investigations.

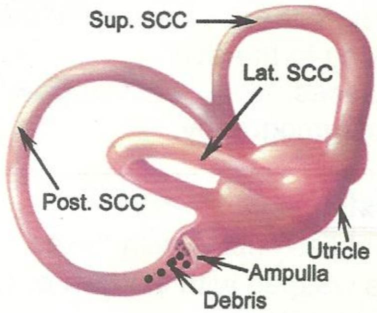
The questions to be asked are:
- Timing: episodic or persistent.
- Ear symptoms: deafness (fluctuant or progressive), tinnitus, earache or discharge.
- Neurological symptoms: loss of consciousness, weakness, numbness or dysarthria.



Causes:

1-Physiological: a- Rotation stimulation
b- Thermal stimulation

2- Pathological: either



a) Peripheral

I- Inner ear (Vestibular):

i- Meniere's disease.

ii- Trauma:

Accidental → Fracture skull base.
Surgical → post-operative (perilymph fistula).

iii- Labyrinthitis: as before (in SNHL)

iv- BPPV ((Benign paroxysmal positional vertigo).

BPPV: Vertigo of sudden onset and short duration (about 30 seconds) when the patient takes certain position (no cochlear affection).

- Cause: debris in post. SCC.
- Treatment: 1- Repositioning of the debris by Eply maneuver.
2- Singular nerve neurectomy (nerve of post. SCC).

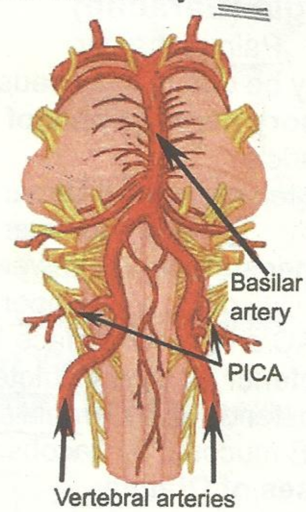
II- Vestibular nerve:

i- Vestibular neuritis.

Vestibular neuritis: Acute onset of vertigo due to functional failure of the vestibular nerve (no cochlear affection).

- Cause: may be due to micro-haemorrhage in the vestibular nerve caused by viral infection.
- Treatment: 1- Anti-vertigo (as Dramamine).
2- Anti-emetic (as Chlorpromazine).

ii- Cerebellopontine angle lesions (CPA).



B) Central:

i- Inflammatory: Meningitis-encephalitis.
ii-Traumatic: Head trauma.
iii-Vascular: Thrombosis - Hemorrhage-Embolism (THE).
iv-Neoplastic: Cerebellar tumours.
v- Degenerative: Multiple sclerosis.
vi-Vertebro basilar insufficiency.
vii-Epilepsy.
viii-Lateral medullary syndrome: occlusion of PICA (posterior inferior cerebellar artery)

N.B.: Vertigo is usually associated with nausea and vomiting when severe.

Investigations of a case of vertigo:

Investigations should include audiological and vestibular tests.
The vestibular investigations are:

- Caloric test.
- Elecronystagmography: caloric test + detection of nystagmus on a graph.
- Rotating chair test.
- Dynamic posturography.



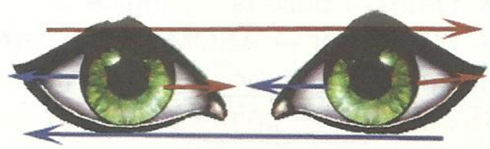
Dynamic posturography

Nystagmus:

Def.: Involuntary oscillatory eye movement.

Causes:

- Physiological: optokinetic nystagmus.
- Pathological:



- Ocular → pendular (i.e. the movement is equal in both directions)
- Vestibular → jerky (i.e. rapid phase to diseased side, slow to other side)
- Central → vertical (i.e. vertical movement)

Observed by: either
- Direct looking to the eye.
- Frenzle glasses.
- Electronystagmography.

- Cold water 30°C
- 7 min → vertigo & Nystagmus
- Warm water 44°C
90-120 sec.

Caloric test:

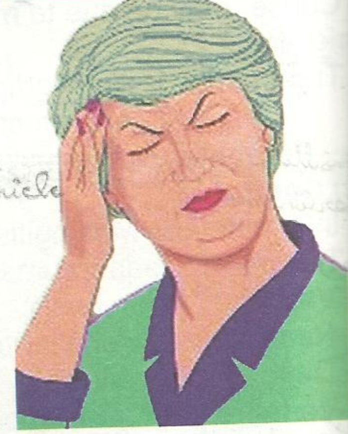
- The patient lies supine with flexed head (30°).
- The ear is washed with cold water (30°) [7 below body temp].
- Rest for 7 minutes.
- Then the ear is washed with warm water (44°) [7 above body temp.]
- Each wash for 40 seconds.
- Normally nystagmus and vertigo occur lasting 90-120 seconds,
  If it takes less than 90 seconds → hypo function.
  If no response → dead ear.

N.B. ACTH: **A**way **C**old, **T**owards **H**eat (direction of rapid phase of nystagmus during ear wash).

N.B.: Motion sickness: Vertigo at motion (car, ship, ... etc).

Impo

Otalgia (Earache)



Def.: Pain in the ear.

It may be due to local causes in the ear or referred pain.

Sensory nerve supply of the ear:

Sensory N. Supply of the auricle

1) Auricle:

a) Outer surface: Upper $^2/_3$ by auriculotemporal of 5th nerve.
Lower $^1/_3$ by greater auricular of $C_{2,3}$

b) Inner surface: Lower $^2/_3$ by greater auricular of $C_{2,3}$
Upper $^1/_3$ by lesser occipital of C_2

2) EAC and outer surface the drum:

a) Anterior ½: by auriculotemporal of trigeminal (5th) nerve.

b) Posterior ½: by Arnold's branch of vagus (10th) nerve.

3) ME mucosa: by Jacobson's branch of glossopharyngeal (9th) nerve.

Causes of Otalgia:

1) Local causes in the ear:

a) Traumatic:

1- Auricle → haematoma.
2- EAC → F.B.
3- Drum → Rupture.
4- Middle ear → Fracture base. (↑ Longitudinal)
5- Eustachian tube → otitic barotrauma.

b) Inflammatory:

1- Auricle → perichondritis.
2- EAC → otitis externa.
3- Drum → bullous Myringitis.
4- Middle ear → ASOM before perforation.
5- Eustachian tube → catarrh in common cold.

N.B.: CSOM is never painful except in: Complications, Acute exacerbation, or Malignant transformation (rare).

"وأما منتظروا الرب فيجددون قوة يرفعون أجنحة كالنسور يركضون ولا يتعبون يمشون ولا يعيون"

+

c) Neoplastic:

- Glomus tumour.
- Sq. cell carcinoma (change of character of long standing CSOM).

2) Referred pain: Through one of the nerves supplying the ear:

a) 5th (Trigeminal):

* Discuss different Causes of Ear ache (otalgia)?

1. - Dental caries
2. - Impacted wisdom tooth.
3. - Maxillary sinusitis.
4. - TMJ arthritis.
5. - Parotitis.

b) 9th (Glossopharyngeal):

- Traumatic: post-tonsillectomy.
- Inflammatory: . Tonsillitis.
  . Suppurations of the pharynx as quinsy, parapharyngeal and retropharyngeal abscess.
- Neoplastic: Carcinoma of the pharynx either Naso-Oro-, or hypopharynx.

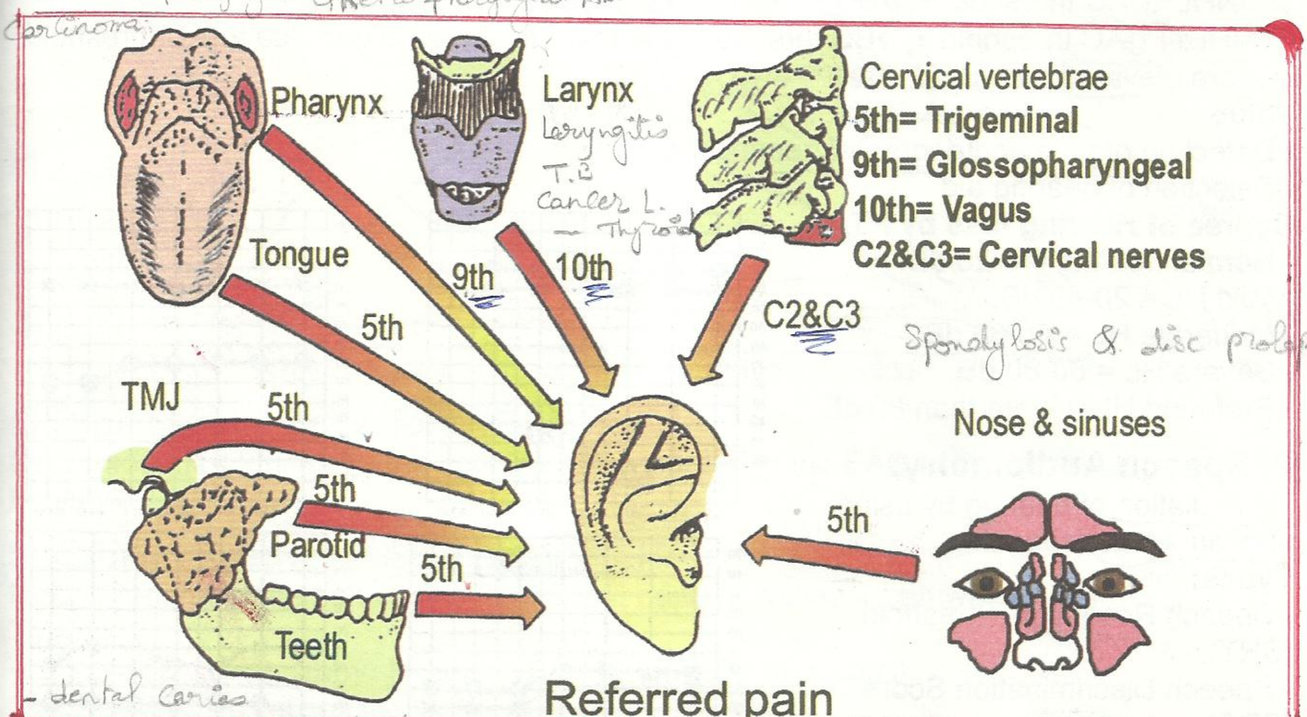
c) 10th (vagus):

- Larynx:
  . Traumatic Laryngitis (Traumatic).
  . T.B. Laryngitis (Inflammatory).
  . Cancer Larynx (Neoplastic).
- Cancer thyroid.

d) $C_{2,3}$ (Cervical plexus):

- Cervical spondylosis.
- Cervical disc prolapse.

Tonsillitis, pharyngeal & Retro pharyngeal Ab.
Carcinoma



- dental Caries
- impacted wisdom tooth
- Maxillary Sinusitis
- parotitis & TMJ arthritis

"ملقين كل همكم عليه لأنه هو يعتني بكم"
+

Audiology

Characters of sound:

1- Frequency: Measured in Hertz (Hz), which is the number of waves/second.
We can hear in the range between 20 to 20.000 Hz.

2- Intensity: Measured in decibel (dB), which is the loudness.
We can hear in range between 0-140dB.

Tuning Fork tests: see clinical ENT.

Audiometry:

Def.: Measurement of hearing by the use of audiometer at different intensities and frequencies.

Types:

1) Pure Tone Audiometery (PTA)

- Stimulation of hearing by using pure tones.
- The test is done once with ear phone to determine AC (air conduction) curve and once with a BC (bone conduction) vibrator over the mastoid to determine BC curve.



- The test is done at 8 frequencies: 125-250-500-1000-2000-4000-6000-8000Hz.
- Results: either

a) Normal hearing: both AC and BC range between 0-20 dB.

b) CHL: ↑AC threshold + Normal BC threshold (i.e. there is air-bone gap).

c) SNHL: ↑AC threshold + ↑ BC threshold (i.e. no air-bone gap).

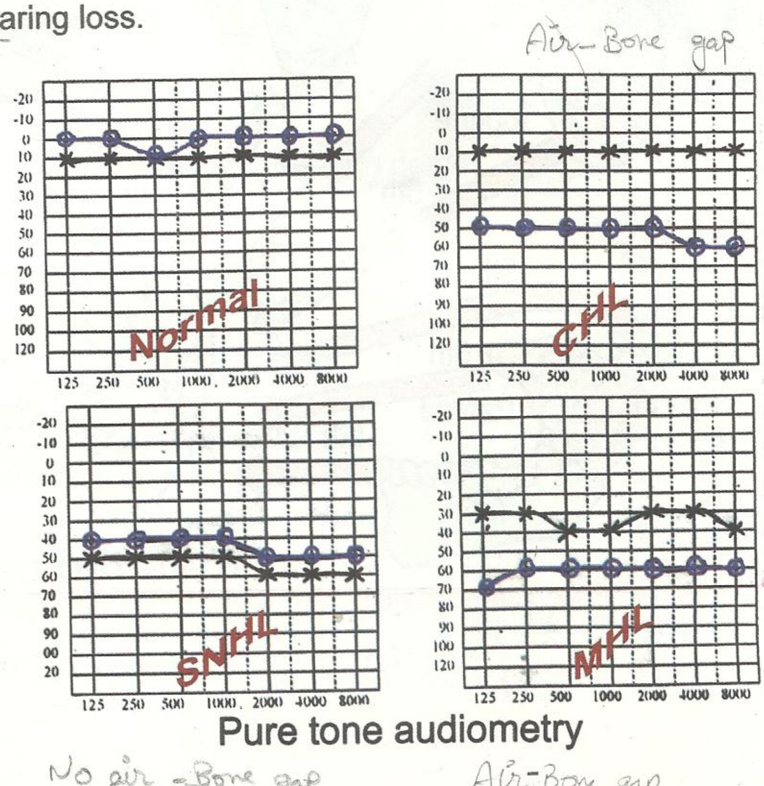
d) MHL: ↑↑AC threshold + ↑ BC threshold (i.e. there is air- bone gap due to AC threshold is more elevated than BC).

Value:

- Detection of type and degree of hearing loss.
- Selection of hearing aid.

Degree of Hearing loss by PTA:

- Normal hearing = 0-20 dB.
- Mild HL = 20-40 dB.
- Moderate HL = 40-60 dB.
- Severe HL = 60-80 dB
- Profound HL = More than 80 dB.



Pure tone audiometry

2) Speech Audiometry:

- Stimulation of hearing by using spoken words (speech).

Types:

- Speech Reception Threshold (SRT).
- Speech Discrimination Score (SDS).

Value:

- Confirm the result of PTA.
- Detect psychogenic deafness.
- Detect retro-cochlear lesion (poor SDS) as in acoustic neuroma.

3) Impedance Audiometry:

a) Tympanometry:

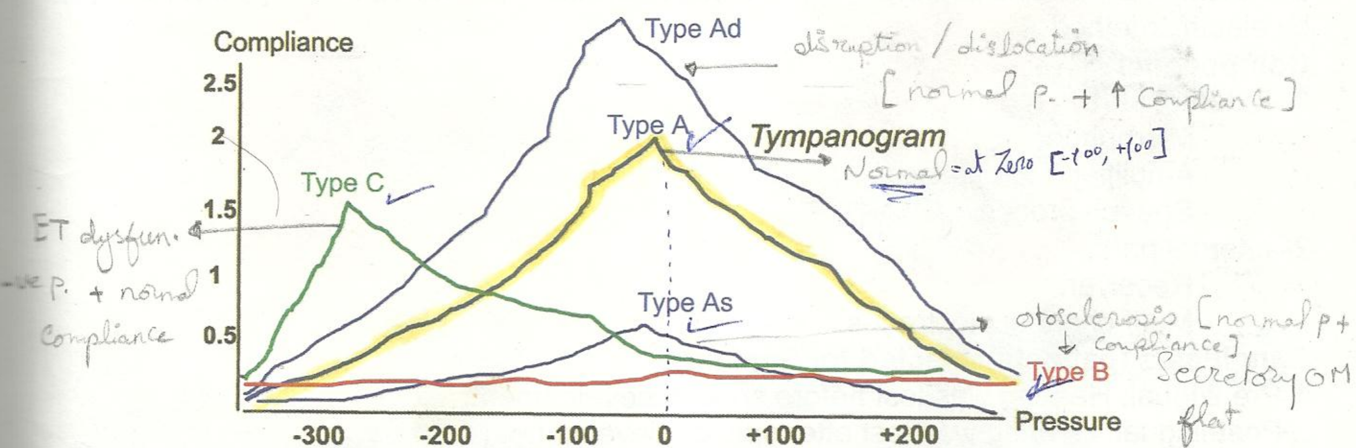
Def.: Measurement of middle ear pressure through measuring the compliance of the drum (i.e. Mobility).

Results:

- Type A curve: In normal cases
  ME pressure is around 0 (i.e.-100 to + 100 mm H_2O)
  Compliance = 0.5 - 1.75 cc.
- Type B curve: In secretory otitis media
  The curve is flat.
- Type C curve: In ET dysfunction
  ME pressure is negative but with normal compliance.
- Type As Curve: In otosclerosis
  ME Pressure is normal but with reduced compliance (i.e. stiffness).
- Type Ad curve: In ossicular chain disruption or dislocation.
  ME pressure is normal but with increased compliance (i.e. hypermobility).
- Oscillating tympanogram: In Glomus tumour.

b) Acoustic (stapedial) reflex:

- Stimulation of hearing by high sound lead to contraction of stapedius and stiffness of the drum (which is measured).
- Uses:
  In otosclerosis: No response (the stapes is fixed).
  In leveling of facial paralysis: No response (if the stapdius was paralysed)



4) OtoAcoustic Emissions (OAEs):

Def.: sound produced by the cochlea and recorded in the EAC (if the inner ear is healthy).

5) Evoked Response Audiometry (ERA):

Def.: Recording the potentiality in different parts of cochlear pathway.

Types:

- **ElectroCochleography:** Measuring the potentiality of cochlea.
  Uses → Meniere's diseases.
- **Auditory Brain Stem Response Audiometry (ABR):** Measuring the potentiality in the cochlear nerve and brain stem.
  Uses → Acoustic neuroma (delayed wave 5).
- **Cortical evoked audiometry.**

Hearing Aids (HA)

-They are sound amplification systems helping the deaf patient to overcome his deafness.

Components:

1- Microphone: to pick up sound and change it to electric energy.
2- Amplifier: to amplify the electric energy.
3- Receiver: change electric energy into sound.
4- Power supply.



Behind the ear hearing aid

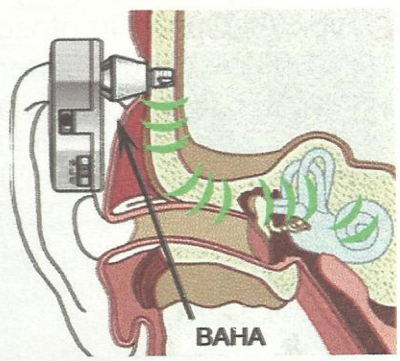
Types of hearing aid:

1- Air conduction hearing aids:
- Behind the ear.
- In the EAC.

2- Bone conduction hearing aids:
Bone anchored hearing aids (BAHA).

Indications:

-Congenital deafness (in meatal atresia ⟶ BAHA).
-Acquired deafness:
. CHL: when the operation is refused or contraindicated.
. SNHL: as presbyacusis and cochlear otosclerosis.



Cochlear Implants

• New method for treatment of patients with bilateral profound sensory hearing loss (i.e. the cochlea is not functioning). So we stimulate the cochlear nerve (which is still healthy) by electric method.

Components:

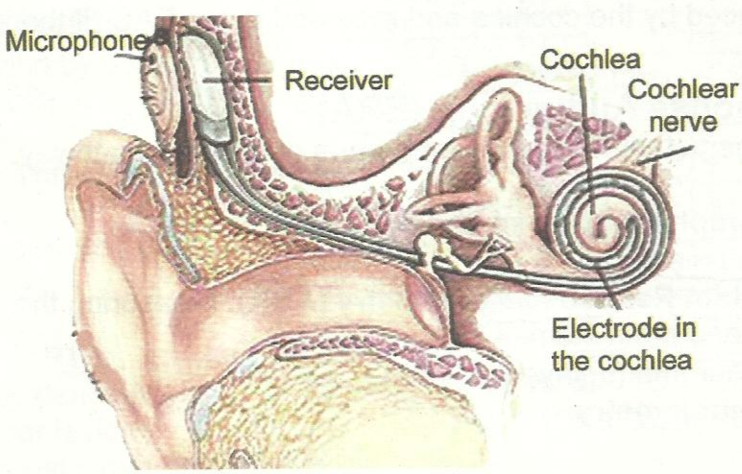
1- External part:
- Microphone.
- Amplifier
- Speech processor.

2- Internal part:
- Receiver.
- Multi-channel electrodes.

Candidates (patients selected for implant):

1-Pre-lingual: Hearing was lost before speech development.
2-Post-lingual: Hearing was lost after speech development.

N.B.: The Post-lingual patients have better results than the pre-lingual patients.



Operations

Myrigotomy

Def.: Incision of the drum.

Indications:

1-ASOM: if there is (for drainage)
- a) Bulging drum.
- b) Small or high up perforation.
- c) Failure of medical treatment after 48 hours (especially in children)
- d) Complications as facial paralysis or mastoiditis.

2-Otitic barotrauma (for drainage).

3-Secretory otitis media (SOM) with insertion of ventilation tube (for ventilation): after failure of medical treatment.

Technique:

- Anaesthesia:

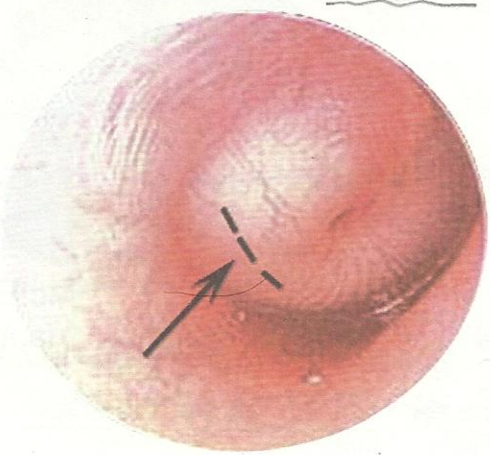
General anaesthesia (GA) in children.

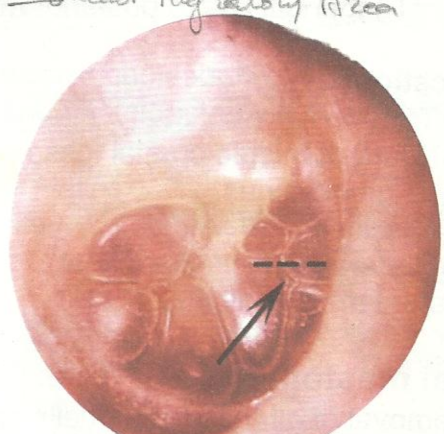
Local anaesthesia (LA) or (GA) in adults.

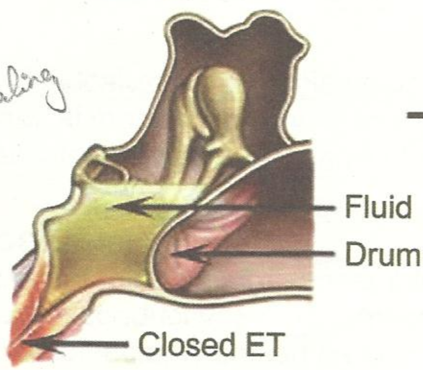
- Incision:

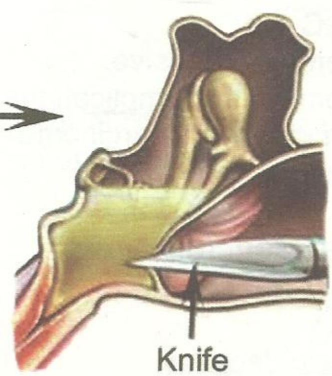
In ASOM: The incision in postero-inferior quadrant.

In SOM: The incision in antero-superior quadrant. → least migratory area









Advantages in ASOM:
- To relief pain.
- Surgical incision heals better than pathological perforation.

Complications:

1) Injury to:
- a) Incudostapedial joint. bet. incus & stapes
- b) High Jugular bulb.

2) Persistent perforation.

3) Tympanosclerosis

Cortical Mastoidectomy

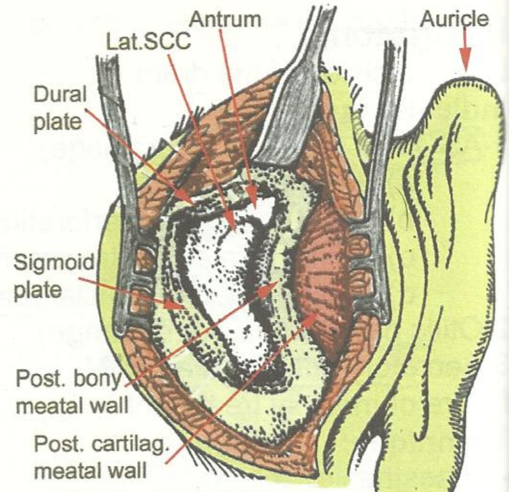
Def.: Removal of all mastoid air cells.

Indications:

1) Acute mastoiditis: if there is
    - a) Failed medical treatment for 48hs.
    - b) Associated with other complications.
    - c) Mastoid abscess (any type).
2) Part of another operation:
    - a) Radical mastoidectomy.
    - b) Tympanoplasty.

Technique:

- Anaesthesia: General.
- Incision: Post-auricular (but take care in children)
- Removal of mastoid cortex, then opening of the antrum (through Mc Ewen`s triangle) and removal of mastoid air cells.



Cortical mastoidectomy

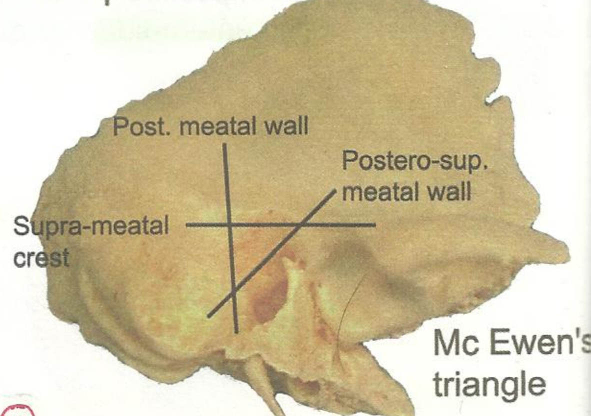
N.B. Mc Ewen's triangle: is the surgical landmark for mastoid antrum

Superior: Suprameatal crest

Anterior: Postero-superior meatal wall.

Posterior: Tangential line to posterior meatal wall.

Temporal bone



Complications:

1) Injury to:
    - a) Dura of middle cranial fossa.
    - b) Sigmoid sinus.
    - c) Facial nerve.
    - d) Lateral semicircular canal.
2) Persistent mastoid fistula.

Radical mastoidectomy

Def.: Removal of all mastoid air cells and all middle ear contents except the stapes, converting the mastoid and middle ear into single large cavity.

Indications: 2C + 2T

1- **C**holesteatoma if extensive.
2- Cholesteatoma with **C**omplications.
3- **T**umour of middle ear: Carcinoma – Glomus.
4- **T**.B. otitis media.

Techniques :

- Anaesthesia: General.
- Incision: Post-auricular.
- **5 points:**

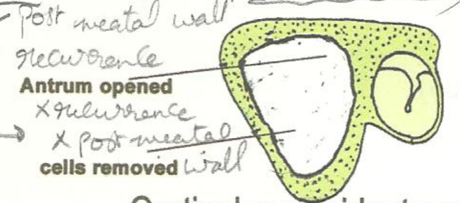
1- Cortical mastoidectomy.
2- Removal of all middle ear contents except the stapes.
3- Removal of the posterior wall of external canal (bony part) by:
    - Removal of the bridge (upper part of posterior wall).
    - Lowering of the facial ridge (lower part of posterior wall).
4- Obliteration of Eustachian tube.
5- Meatoplasty: Widening of the external auditory meatus (cartilaginous part).

Complications:

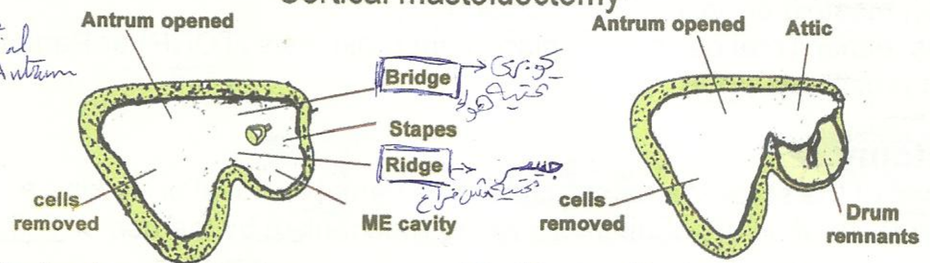
1-, 2-: as cortical mastoidectomy.

3- Mastoid cavity problems: as persistent discharge and wax accumulation.
4- Recurrent cholesteatoma.

N.B. Modified Radical mastoidectomy (attico-antrostomy): The same as radical but with removal of unhealthy tissue and preservation of healthy tissues (ossicles or part of drum).



Cortical mastoidectomy



Radical mastoidectomy Modified radical mastoidectomy

N.B.: There are 2 lines of treatment for cholesteatoma:

A) Canal wall up (closed) Technique:

- **Def.:** Combined approach tympanoplasty i.e. we remove cholesteatoma from the middle ear through EAC and from the antrum through cortical mastoidectomy (i.e. combined) and we may open facial recess.
- **Advantages:** Preservation of posterior meatal wall (of EAC).
- **Disadvantages:** High incidence of residual or recurrent cholesteatoma, so 2nd look operation is usually carried out after 6 months.

B) Canal wall down (open) Technique:

- **Def.:** Removal of cholesteatoma through antrum and ME with removal of posterior meatal wall (All or part of it) to facilitate eradication of the disease.
- **Advantages:** Low incidence of recurrent or residual cholesteatoma.
- **Disadvantages:** No preservation of posterior meatal wall → difficult reconstruction of hearing.
- **Types:**
  1- Atticotomy: in localized attic cholesteatoma.
  2- Modified radical mastoidectomy: in localized attico-antral cholesteatoma.
  3- Radical mastoidectomy: in extensive cholesteatoma or if there is complicated CSOM

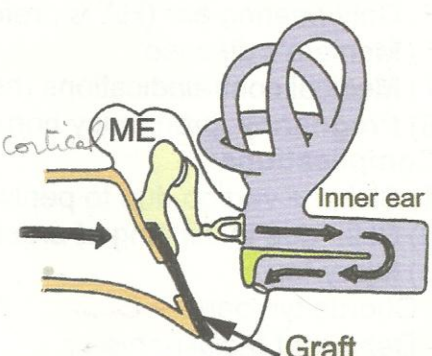
Tympanoplasty

Def.: Eradication of middle ear disease and **Reconstruction** of conductive hearing mechanism.

N.B. Cortical mastoidectomy should be combined with tympanoplasty if there is ear discharge.

Indications: 2C + 2T
1) **CSOM** (Safe type)
2) **Congenital middle ear anomalies.**
3) **Traumatic rupture of drum** (myringoplasty).
4) **Traumatic dislocation of the ossicle** (ossiculoplasty).

Technique:
- Anaesthesia: General or Local.



Tympanoplasty

- Incision: Post-auricular.
- Eradication: Removal of polyps and granulation tissues.
- Reconstruction: of

A) Drum by Myringoplasty:

The graft material may be:

1- Temporalis fascia.
2- Perichondrium (from tragus).

B) Ossicles by ossiculoplasty:

The graft material may be

1- Cartilage: from tragus or septum.
2- Bone: from mastoid or patient own ossicles.
3- Prosthesis: either Total ossicular replacement prosthesis (TORP) or Partial ossicular replacement prosthesis (PORP)

Stapedectomy

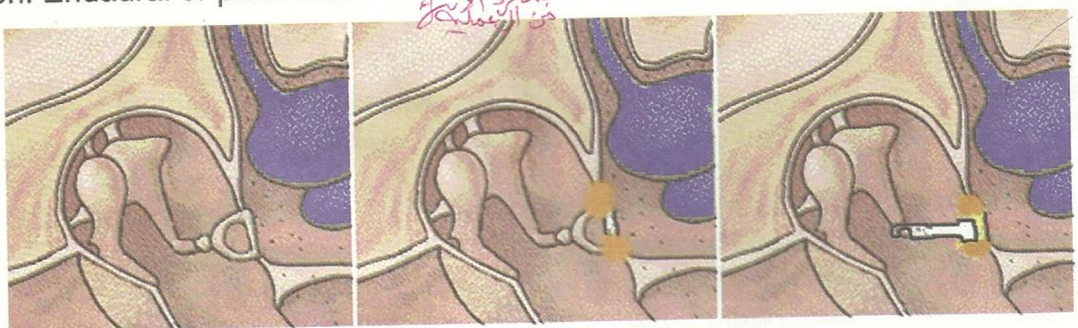
Def.: Removal of the stapes superstructure then partial removal or making a hole in the footplate and restoration of conductive hearing mechanism by the use of Teflon piston or fat and wire.

Indications:

Stapedial otosclerosis causing CHL with air-bone gap more than 20 dB.

Technique:

- Anaesthesia: General or Local.
- Incision: Endaural or permeatal.



Normal Otosclerosis After stapedectomy

Contraindications: CSOM + pregnancy.

1) **C**hildren: otosclersis is active.
2) **S**NHL
3) **S**chwartz sign +ve.
4) **O**ld age
5) **O**nly hearing ear (HA is preferred)
6) **M**eniere's disease
7) **M**edical contraindications (however local anaesthesia may be used).
8) **Pregnancy**: pregnancy hormones activate otosclerosis.

Complications:

1) SNHL + vertigo due to perilymph fistula.
2) CHL: due to slipping of prosthesis.
3) Injury to:
- Chorda tympani.
- Dehiscent facial nerve.

Nose



"إن كان الله معنا فمن علينا"
+

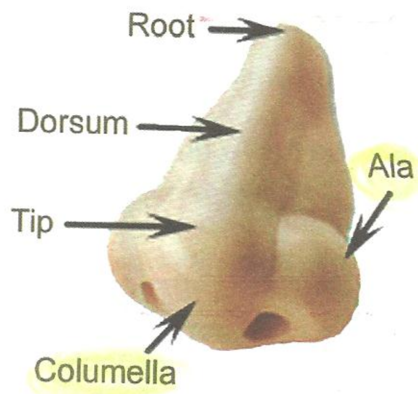
Nose

Anatomy

External nose:

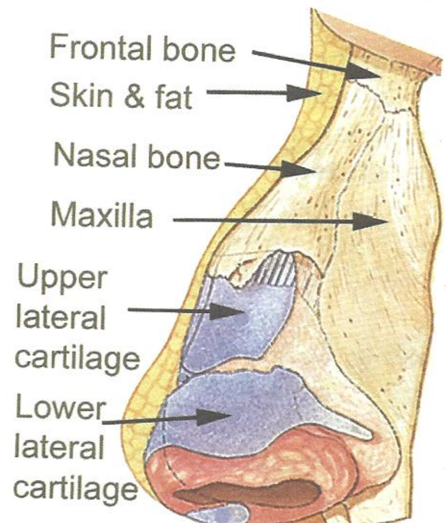
* Pyramidal in shape

The lower lateral rounded part is called ala while the medial lower part is called columella.



The nasal skeleton:

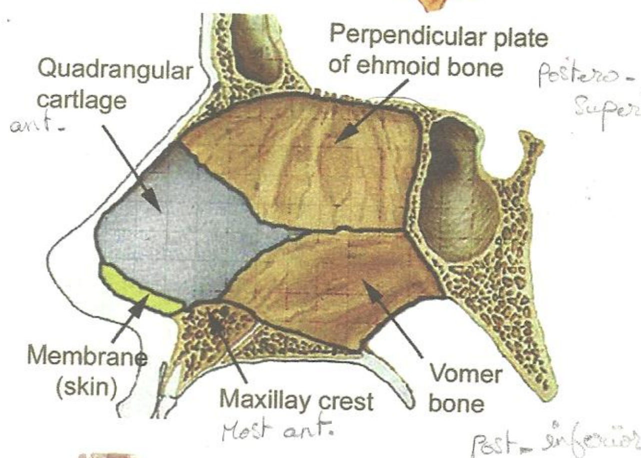
1- *Bony part* formed of:
-Two nasal bones.
-Nasal process of frontal bone (above-on each side).
-Nasal process of maxillary bone (below-on each side).
2- *Cartilaginous part* formed of:
- Upper and lower lateral cartilages.
- Septal cartilage.



Nasal cavity:

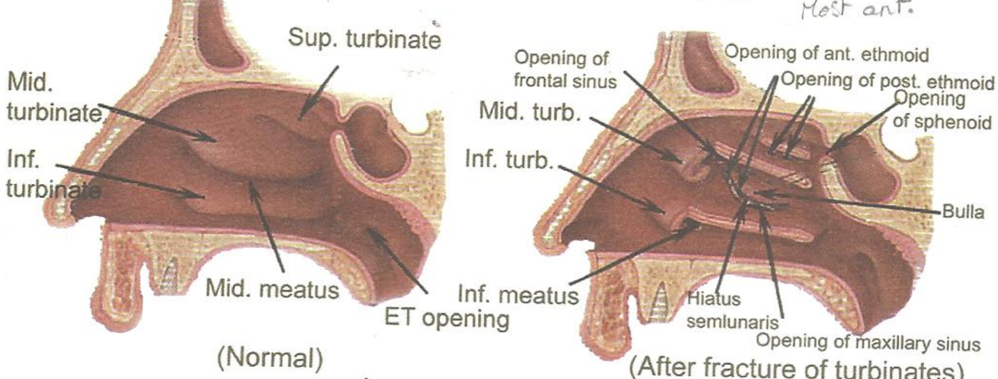
-Tow cavities separated by the septum.
-Each cavity has anterior opening (anterior nares), posterior opening (choana), roof, floor, medial and lateral walls.

* **Anterior nares:** bounded by columella medially and ala laterally.
* **Choana:** bounded by the vomer medially and medial pterygoid laterally.
* **Roof:** Cribriform plate of ethmoid bone.
* **Floor:** Hard palate (anterior $^2/_3$ = Maxilla, posterior $^1/_3$ = palatine bone).
* **Medial wall:** the nasal septum formed of:
  - Quadrangular cartilage: anterior part.
  - Perpendicular plate of ethmoid bone: posterosuperior.
  - Vomer (separate bone): posteroinferior.
  - Membranous part and maxillary crest: most anterior.



* **Lateral wall:**

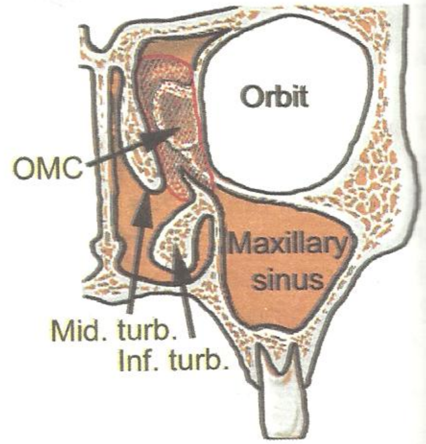
It shows: 3 elevations, 4 spaces (elevation = turbinate, space = meatus):



Lateral wall of the nose

1- Inferior turbinate: the largest of 3, rich in blood supply and veins.
The inferior meatus below it, and shows the opening of nasolacrimal duct.

2- Middle turbinate: middle in size and site.
The middle meatus opens below it and show the following features:
A) The bulla ethmoidalis: rounded projection; the largest of the anterior ethmoidal air cells.
B) Hiatus semilunaris: Semilunar groove below the bulla.
C) Uncinate process: Shelf of bone medial to the bulla.



N.B.: The following sinuses open in the middle meatus:
-The frontal sinus opens through the frontal recess at the most anterior part.
-The maxillary sinus opens in the posterior part.
-The anterior ethmoidal sinus opens in middle part.
* **Ostiomeatal complex (OMC):** It is the area of drainage of anterior group of sinuses. Present between lamina paparycea i.e. medial orbital wall: laterally and middle turbinate: medially.

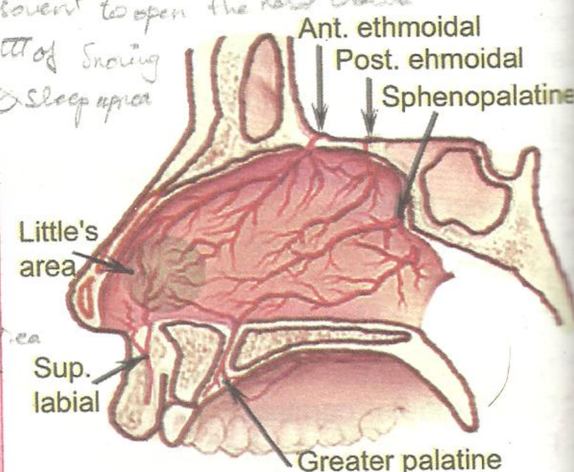
3-Superior turbinate: the smallest, and the superior meatus below it.
The posterior ethmoid opens in the superior meatus.

4-Sphenoethmoidal recess: above the superior turbinate.
The sphenoid sinus opens into it.

N.B.: Nasal valve: The narrowest part, at the junction of lower and upper lateral cartilages i.e. anterior end of inferior turbinates.

Blood supply:
(1) External nose
- Nasal branches of facial artery.
- Nasal branches of infra-orbital artery.
- Dorsonasal branches of ophthalmic artery.

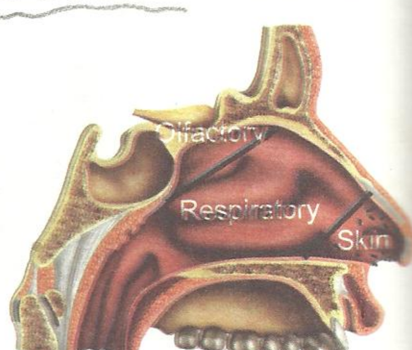
(2) Nasal cavity:
- Anterior and posterior ethmoidal arteries: superior part
- Sphenopalatine artery: posterior part.
-Superior labial of facial and Greater palatine of maxillary arteries: antero-inferior part.



Blood supply of the nose

Venous drainage:
The nasal veins are connected to the cavernous sinus through the ophthalmic veins.
N.B.: The dangerous triangle of the face:
Infection in which may lead to cavernous sinus thrombosis.
Boundaries: extends from root of nose superiorly to the corner of mouth on each side.

Nerve supply:
- Sensory: Maxillary nerve.
- Olfactory (smell): Olfactory nerve (1st cranial).
- Autonomic: Nerve of pterygoid canal (Vidian); formed of
. Sympathetic (Deep pertrosal nerve): vasoconstrictor
. Parasympathetic (Greater Superficial Petrosal nerve): secretomotor



Histology:
- Lower part (vestibule): skin contains vibrissae hair.
- Middle part (respiratory part): respiratory mucosa.
- Upper part (olfactory part): olfactory neuroepithelium.

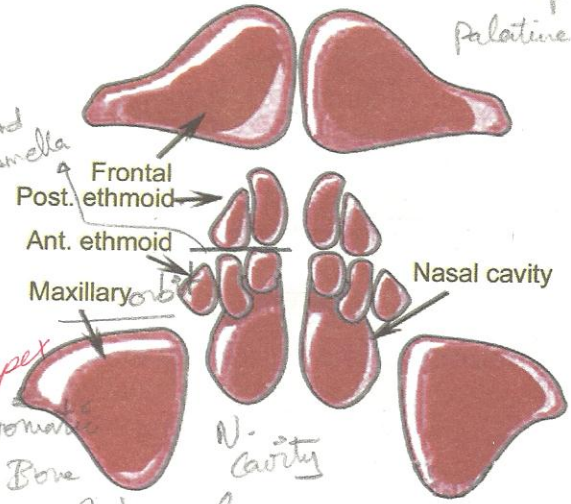
Paranasal sinuses

Four pairs of sinuses arranged into 2 groups:

1- Anterior group: frontal, maxillary, and anterior ethmoid. All open into the middle meatus (OMC).

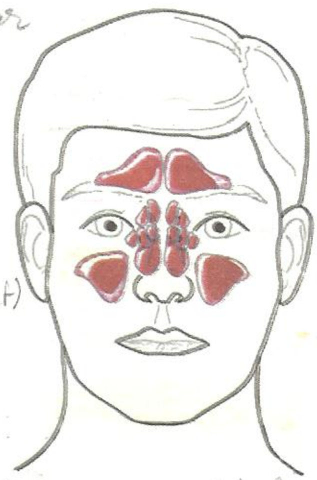
2- Posterior group: posterior ethmoid and sphenoid.
The 1st opens into superior meatus.
The 2nd opens into sphenoethmoidal recess.

All the sinuses are lined by respiratory mucosa.



(A)The Maxillary Sinus (Antrum):

-Pyramidal in shape with the apex directed to the zygomatic bone.
-Boundaries:
Roof: Orbit and infra-orbital nerve and vessels.
Floor: Alveolar process (2nd premolar and 1st molar teeth).
Anterior: Cheek
Posterior: Pterygo-palatine fossa.
Medially: Nasal cavity.
-It opens in the posterior part of middle meatus.



(B)The Frontal Sinus:

-It is not present at birth and starts to appear 2-4 years.
-It opens in the anterior part of middle meatus.

(C)The Ethmoid Sinuses:

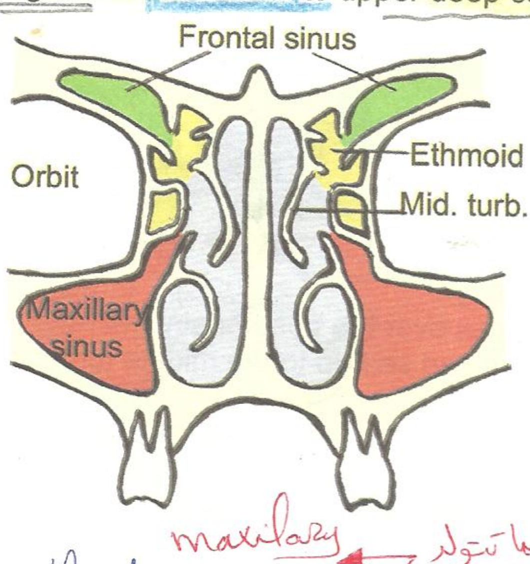
-Formed of anterior and posterior ethmoid sinuses, separated from each other by bone, which is called the ground lamella.
-The anterior ethmoidal sinus opens in the middle meatus.
-The posterior ethmoidal sinus opens in the superior meatus.

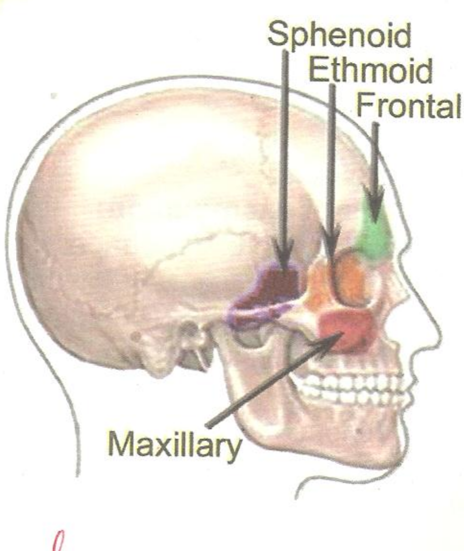
(D)The sphenoid sinus:

-Cavity within the body of the sphenoid bone.
-The pituitary gland presents above it in the sella turcica.
- It is related to the internal carotid artery (ICA) and optic nerve.
-It opens into the spheno-ethmoidal recess.

Lymphatic drainage of nose and sinuses:

Anterior part to submandibular lymph nodes (LNs) while the posterior parts to retro pharyngeal LNs then both to upper deep cervical LNs.





Physiology

Functions of the Nose:

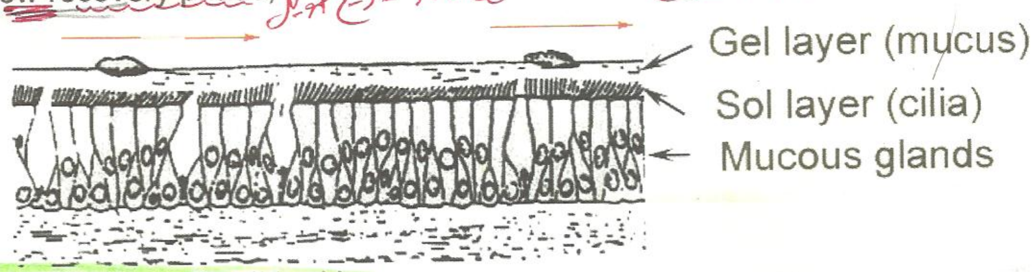
1- Respiratory function.
2- Smell.
3- Resonance of voice.
4- Protective function:
  a-Vibrissae (hair) filter the large particles.
  b-Ciliae of the mucosa filter the small particles.
  c-Humidification and warming of inspired air.
  d-Reflex sneezing.
  e-Lysozyme in nasal secretions.
5- Drainage of lacrimation.

Functions of the paranasal sinuses:

1- Lighten the weight of the skull.
2- Humidification and warming of inspired air.
3- Resonance of voice.
4- Insulate the brain from atmospheric temperature changes.

Muco-ciliary clearance (Mucous blanket): Ciliated mucosa that protect the airway

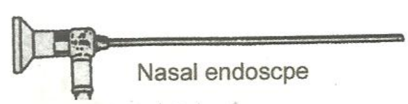
Structure:
1-Superficial thick (viscid) layer (Gel layer).
2-Deep thin (watery) layer (Sol layer).
The cilia is embedded in the deep thin layer and moved backwards towards the nasopharynx (to wash the gel layer), this movement is biphasic formed of active rapid phase and slow recovery phase.



The normal ciliary action is inhibited by:
1- Change in temperature: excessive heat or cold.
2- Smoking.
3- Infection.

N.B. Symptoms of nasal diseases:

-Nasal obstruction.
-Epistaxis.
–Smell disorder.
–Snoring.
–Orbital symptoms.
-Nasal discharge.
-Facial pain and headache.
–Sneezing.
–Swelling or deformity.



N.B. Methods of examination:

-External examination: Shape: for deformity or swelling.
Airflow: for nasal patency.
Palpation: for tenderness over the nose or sinuses.
-Anterior rhinoscopy: by using nasal speculum, we can see up to the middle turbinate and meatus.
-Posterior rhinoscopy: by using posterior rhinoscopy mirror, we can see the post-nasal space (nasopharynx).
-Nasal endoscopy: by using rigid nasal endoscope, we can see the entire nasal cavity.

"أنا الرب إلهك الممسك بيمينك القائل لك لا تخف أنا أعينك"

Congenital Diseases

Choanal Atresia

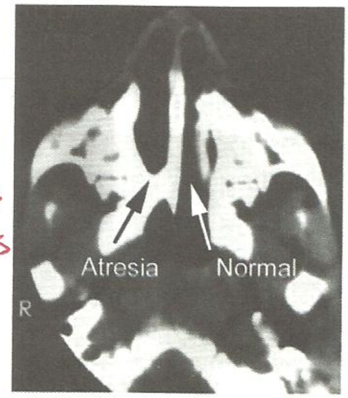
Case key: bilateral Nasal obst. + Cyanosis by Crying

Def.: Congenital obstruction of the choana (posterior nasal opening)
Cause: Persistent bucco-nasal membrane.
Types: Bony or membranous / Unilateral or Bilateral

Clinical Picture:

*Symptoms:

- Unilateral atresia: It may pass unnoticed till the childhood:
  - a) Unilateral nasal obstruction.
  - b) Unilateral nasal discharge.
- Bilateral atresia: It is an emergency situation at birth as the infant is obligate nose breather in the first 2-3 months,
  - a- Bilateral nasal obstruction.
  - b- Bilateral nasal discharge.
  - c- Difficult suckling.
  - d- Cyanosis which improve on crying → Intermittent Cyanosis = Paradox Cyanosis



CT: Choanal atresia

*Signs:

- Rubber catheter cannot be passed from nose to nasopharynx.
- Coloured drops cannot be passed from nose to nasopharynx.

Investigations:

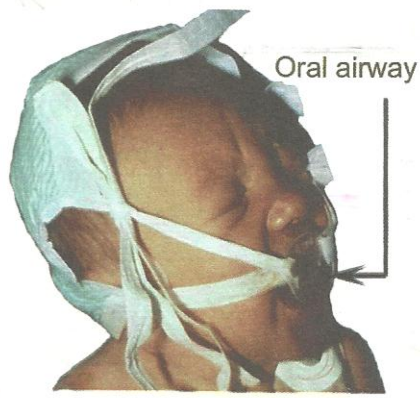
- X-ray with lipiodol (dye): the dye cannot pass to nasopharynx.
- CT → differentiate between bony/and/membranous atresia.

Treatment:

Unilateral: The operation is postponed till the condition become stable.

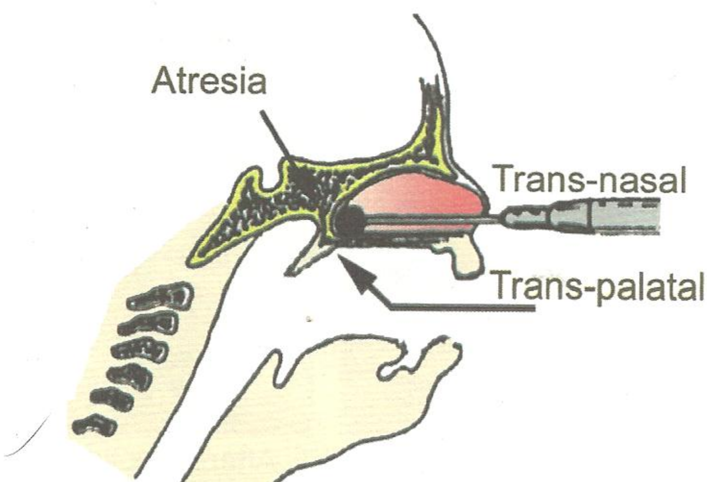
Bilateral: Emergency situation:

1- Saving the airway after birth by maintaining the mouth opened; by either:
- Plastic oral airway
- Endotracheal intubation
- McGovern nipple.

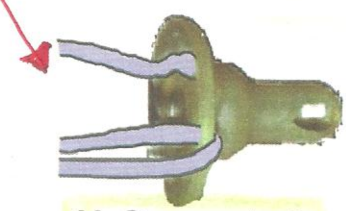


2- When the condition improved, proceed to the operation.

The operation is either.
- Trans-nasal by endoscope.
- Trans - palatal.



Operations for choanal atresia


McGovern nipple

WhiteKnightLove

Traumatic Diseases

I Fracture Nasal Bones

Causes: blow or car accident.



Clinical Picture:

- Symptoms:

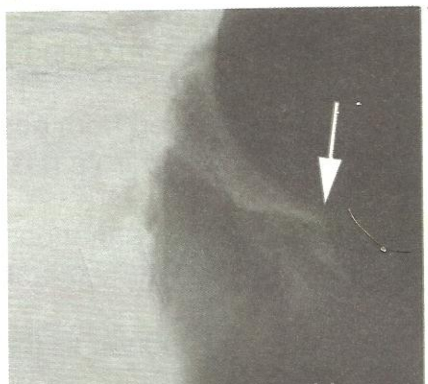
History of trauma.
Pain.
Epistaxis.
Nasal obstruction.
Swelling and deformity.

- Signs:

Inspection:
- Swelling :oedema, haematoma, or surgical emphysema (air under the skin).
- Deformity either deviation or depression.

Palpation:
- Tenderness
- Crepitus.

Anterior rhinoscopy:
- Lacerated mucosa (blood clot).
- Dislocation of septum.


X-ray: fracture nasal bones

Investigations:

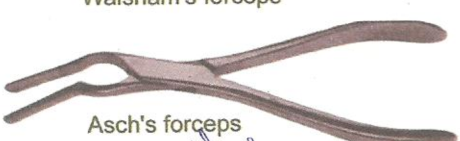
X-ray for medicolegal purposes.

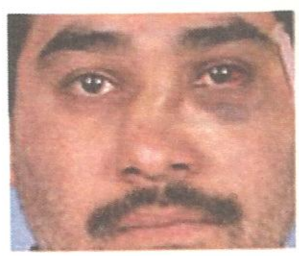
Treatment:

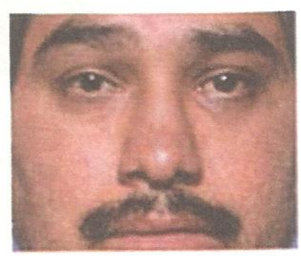
1- Control the epistaxis (if present).
2- ***Reduction*** of fractured bones:
a) If no oedema (early within few hours from trauma): Reduce it immediately under General anaesthesia either manually or by instrument Walsham's forceps for nasal bones and Asch's forceps for septum).
b) If there is oedema: wait one week till the oedema disappear then reduce the fracture.
c) After 2 weeks (malunion): Wait for 3 months, and then do rhinoplasty.
3- ***Anterior nasal packing***: to support nasal bones from inside (for 48 hours).
4- ***Fixation*** of bones by plaster of Paris or auliminium sheet: to support nasal bones from outside (for 2 weeks).
5- Antibiotics, analgesics, and anti-inflammatory.


Fixation by aluminium splint


Walsham's forceps


Asch's forceps


Before reduction


After reduction

2 Foreign Body (FB) in the Nose

Type of the patient: Child or mentally retarded adult.

Type of F.B.:

- Vegetable as seeds, beans......
- Non vegetable as beads, paper.....



Mentally retarded child with FB in nose

Clinical Picture:

- **Symptoms:**

Unilateral nasal obstruction.

Unilateral offensive nasal discharge.

- **Signs:**

Anterior rhinoscopy: shows FB or discharge.

Nasal endoscopy (sometimes) is needed.

Complications:

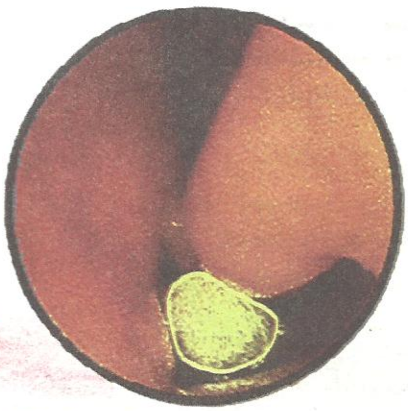
1- Nasal: Early lead to infection (rhinitis and sinusitis).
Late lead to stone formation (rhinolith).

2- Pulmonary: FB inhalation and respiratory obstruction.

Treatment:

1- If the child is co-operative → Removal by forceps, hook or suction.

2- If the child is not co-operative → Removal under general anaesthesia with cuffed endotracheal intubation to prevent FB inhalation during the procedure.



FB between inf. turbinate and septum

N.B. FB should be suspected in any child with unilateral nasal obstruction and offensive discharge.

3 Oro-antral fistula

Def.: Fistula between oral cavity and maxillary antrum (oro-maxillary).

Causes:

1- Traumatic:

a) Surgical trauma:

- Dental extraction (2nd premolar or 1st molar).
- Radical antrum operation
- Excision of dental or dentigerous cyst.

b) Accidental trauma: penetrating injury.

2- Inflammatory: osteomyelitis of maxilla or syphilitic osteitis.

3- Neoplastic: cancer maxilla eroding the alveolar process.



Oro-antral fistula

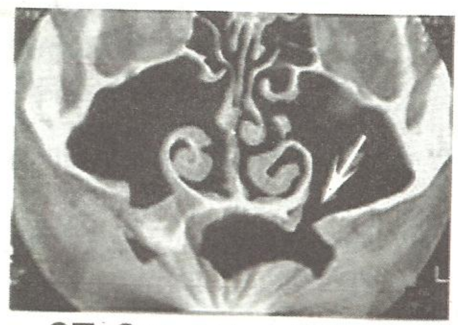
Clinical picture:

Symptoms:

- Unilateral regurgitation of food and fluid.
- Unilateral offensive nasal discharge (sinusitis).
- Discharge through the fistula to the mouth.

Signs:

- Fistula is seen through oral cavity.
- A probe can be passed from mouth to antrum (not preferred).



CT: Oro-antral fistula

Investigation:

- X-ray: opacity of antrum (sinusitis).
- X-ray with lipiodol: the dye will pass through the fistula.
- CT: to show the site of fistula + sinusitis.

Treatment:

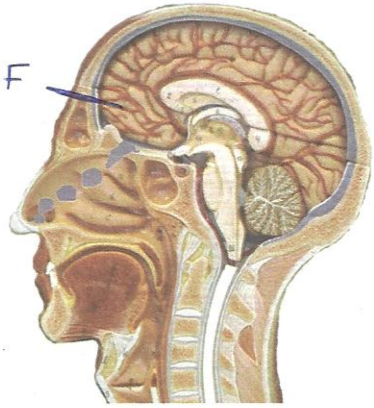
a) Recent cases: (first 24 hours after dental extraction)

- Small fistula: It heals spontaneously
- Large fistula: Surgical closure.

b) Old cases: Surgical closure after refreshening of the fibrosed edge + Radical antrum operation (to clean the sinus).

c) Failed cases: dental obturator.

4 CSF Rhinorrhoea



Def: Leakage of CSF through the nose

Origin:

-Roof of nose: cribriform plate

-Sinuses: ethmoid, frontal or sphenoid sinus.

-Middle ear: CSF otorhinorrhoea through the ET to the nose.

Causes:

1- Traumatic:

a) Surgical: - Endoscopic sinus surgery (ESS)
- Removal of tumour from roof of the nose

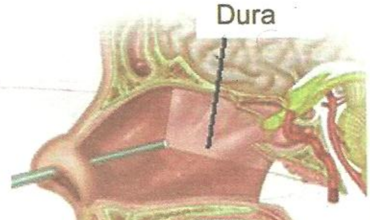
b) Accidental: fracture base of anterior cranial fossa.

2- Inflammatory: syphilitic osteitis or osteomyelitis

3- Neoplastic:tumour eroding the roof of nose.

4- Congenital: defect in the cribriform plate.

5- Idiopathic: of unknown cause.



ESS

Clinical picture:

-**Unilateral watery nasal discharge:**

Which is clear, colourless, has salty taste, dose not stiffen the handkerchief increased by coughing, straining and leaning forwards.

-Headache: may be due to high CSF pressure (caused by Brain tumour) or low CSF pressure (Caused by CSF leakage).

Complications: Meningitis

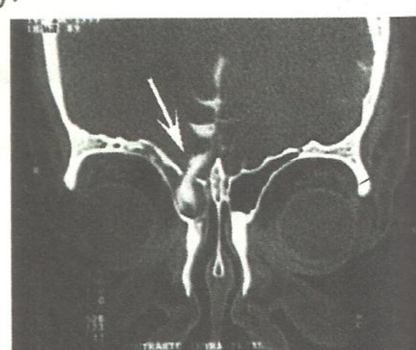
Investigations:

1-Biochemical analysis of discharge, CSF is characterized by:

- Clear, Colourless and contain no mucus.
- Contain sugar more than 30 mg%.
- Reduce Fehling's solution.
- Contain B_2 transferrin, which is diagnostic (B_2 only in CSF).

2-CT with intrathecal metrizamide (Omnipaque): can detect the site of leakage.

3-Intra-thecal dye (flourescine): then detect it in the nasal cavity by nasal endoscope



CT with contrast: CSF rhinorrhoea

Treatment:

A) Conservative: most traumatic cases heal spontaneously

-Bed rest in semi sitting position with the head-up

-Avoid coughing and straining

-Avoid blowing of nose.

-Avoid nasal medications (drops or packing).

-Prophylactic antibiotics to prevent meningitis.

B) Surgical: covering the defect by graft (temporalis fascia) or flap (mucoperi-osteal septal flap); if conservation failed. It can be done externally or recently endoscopic.

Inflammatory Disease

- Skin of vestibule: - Furunculosis.
  - Vestibulitis.
- Mucosa:
  - Acute rhinitis:
    - Specific: Diphtheria
    - Non specific: Common cold, Influenza, Exanthemata
  - Chronic rhinitis:
    - Specific (granuloma): Scleroma, Lupus, Syphilis, Leprosy, Fungal infection
    - Non-specific: Atrophic rhinitis, Hypertrophic rhinitis

1 Furunculosis

Septal Abscess

Def.: Staphylococcal infection of hair follicles (in the vestibule).

Causes: Scratch - diabetes (Sugar)

Clinical picture:

Symptoms:

- Pain and swelling of nose.
- Purulent discharge if the furuncle ruptured.

Signs: Red, hot, tender nodule in the vestibule.

Complications:

- Septal abscess.
- Cavernous sinus thrombosis. → dangerous Δ of the face

Treatment:

Medical:

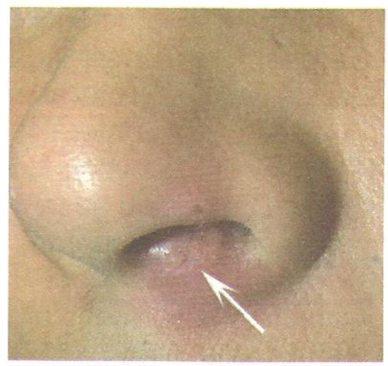
-General: Systemic antibiotics + Analgesics.

-Local: Antibiotic cream.

Surgical: incision and drainage if there is pus.

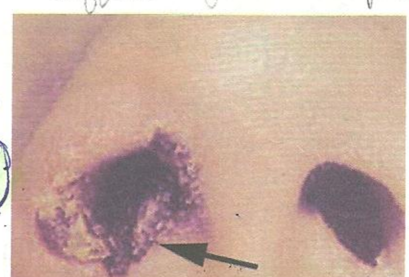
N.B.: Avoid squeezing of furuncle, to avoid cavernous sinus thrombosis (DangerousΔ).

Staphylococcal infection



Furuncle

diffuse inf. in skin of vestibule



Nasal vestibulitis

2 Vestibulitis

Def.: Diffuse inflammation of the skin of the vestibule.

Causes: 2ry to nasal discharge of common cold.

Clinical picture: diffuse redness and excoriation of the skin of nostril.

Treatment: as the medical treatment of furuncle.

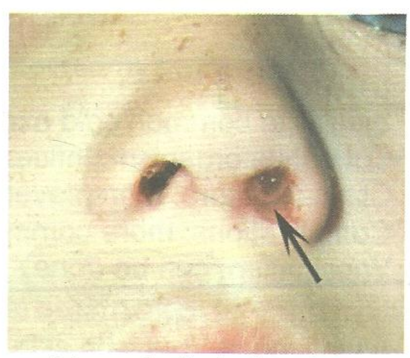
3 Nasal Diphtheria = Inflammatory Mucosal specific acute Rhinitis

-Usually 2ry to faucial (pharyngeal) diphtheria.

-It causes unilateral pseudomembrane which lead to **unilateral** nasal obstruction and serosanguinous discharge (see faucial diphtheria).

UniLateral

Serosanguinous offensive discharge

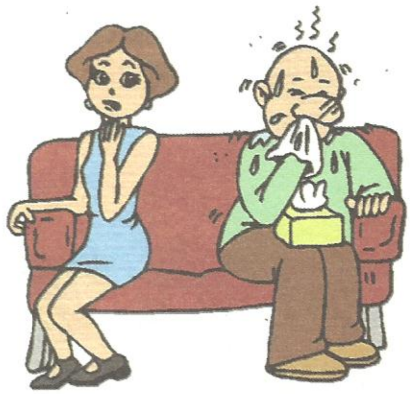


Nasal diphtheria

2ry to faucial diphtheria

Common Cold (Coryza)

Causative organism: Rhinoviruses (More than 100 types).
Mode of transmission: Droplet infection.
Predisposing factors:
- Over-crowdness.
- Low immunity.
- Exposure to temperature changes.



Incubation period: 1 - 3 days.

Clinical picture: 4 stages

Symptoms:

1- Stage of vasoconstriction:

General: - Bony aches.
Local: - Dryness.
- Burning sensation in the nose.
- Sneezing.

2- Stage of vasodilatation:

General: Fever, headache and malaise.
Local: - Bilateral nasal obstruction.
- Bilateral watery nasal discharge.



3- Stage of 2ry bacterial infection:

General: ↑ fever, headache and malaise.
Local: - Bilateral nasal obstruction.
- Bilateral mucopurulent nasal discharge.

4- Stage of Recovery: in about 3 days (without 2ry infection).

Signs: Congested nasal mucosa with watery or mucopurulent discharge.

Complications:

- Infection of surrounding structures:
As sinusitis, otitis media, pharyngitis, laryngitis and bronchitis.
- Anosmia, which may be permanent (viral peripheral neuritis).



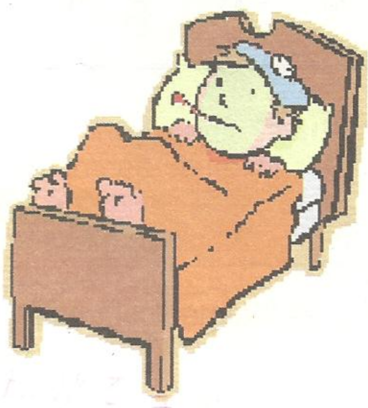
Treatment:

A) Prophylaxis:

- Avoid predisposing factors.
- Vaccination is of no value.

B) Curative:

- Complete bed rest and plenty of warm fluids.
- Antibiotics to prevent 2ry infection.
- Analgesic& antipyretic.
- Antihistaminic.
- Vitamin C.



Influenza

Similar to common cold except:
Causative organism: Influenza virus type A, B and C.
Clinical Picture: more severe.
Complications: more common.
Vaccination: can be done.

Rhinitis of Exanthemata

As influenza (but with skin rash), e.g. Measles.

Chronic hypertrophic rhinitis

Def.: Chronic nonspecific Rhinitis with hypertrophy of nasal mucosa especially of the turbinates.

Causes:

- Repeated acute Rhinitis (common cold).
- Persistence of the predisposing factors
- Allergic rhinitis.

Clinical picture:

Symptoms

-Bilateral nasal obstruction.

-Bilateral mucoid nasal discharge (anterior and post-nasal discharge).

Signs: Hypertrophied inferior turbinate, dose not shrinks with local vasoconstrictor.



CT: hypertrophied turbinates

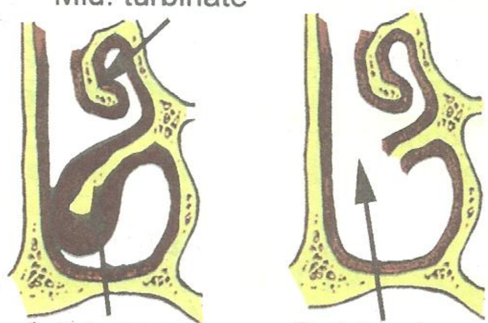
Treatment:

1- Treatment of the cause.

2- Medical: Steroid nasal spray.

3- Surgical: Reduction of inferior turbinate by either

- Sub mucous diathermy
- Partial turbinectomy.
- Laser turbinectomy.



Chronic Atrophic Rhinitis

Def.: Chronic non-specific Rhinitis with atrophy of nasal mucosa (and its contents) and its bony turbinates.

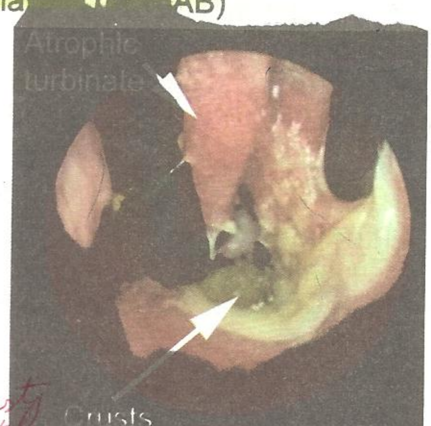
Causes:

a) 1ry: bilateral and more in female, of unknown cause but may be (DAHAB)

Deficiency of iron and vitamin A.
Autoimmune disease.
Hormonal (oestrogen deficiency).
Autonomic imbalance (sympathetic over activity).
Bacillus ozaenae infection.

b) 2ry: destruction of nasal mucosa due to either

Granuloma
Operations as turbinectomy
Irradiation
Deviated septum (in wider side).



Clinical picture:

Symptoms:

* Nasal obstruction (in spite of roomy nose): Due to loss of sensation of air passage (atrophy of nerve endings).
* Nasal discharge: crusty, greenish black and offensive (not perceived by patient).
* Anosmia (atrophy of olfactory mucosa).
* Epistaxis on removal of crusts.

Signs:

* Atrophic dry nasal mucosa.
* Atrophic turbinates.
* Roomy nasal cavity.
* Crustations, which is greenish black, offensive with bleeding on removal.

Treatment:

1- Treatment of the cause.

2- Medical:

a) Alkaline nasal douche → dissolve crusts.

b) Menthol paraffin oil (nasal drops) → ↓ offensive odour (foetor).

c) 25% Glucose in glycerin (nasal pack) → ↓ proteolytic organisms.

d) Potassium iodide (systemic) → stimulates gland secretion.

e) Oestrogen (Local) → stimulates gland secretion.

f) Mucolytics.

g) Iron and vitamin A.

h) Antibiotic.

3- Surgical: Aim → narrowing of nasal cavity till the mucosa regenerate.

a) Submucosal augmentation by bone or cartilage.

b) Young's operation: closure of one side of the nose for one year then open it and operate on the other.

Granuloma of Nose

Definition: Granuloma is chronic specific inflammation characterized by formation of macrophages.

Types:
1. Rhinoscleroma: the commonest.
2. Syphilis.
3. Lupus.
4. Leprosy.
5. Fungal infection.

I Rhinoscleroma:

- The commonest granuloma in Egypt.
- Caused by klebsiella rhinoscleromatis. (G-ve intracellular diplobacilli).
- More common in females. (Starts 15 - 25 years).
- Endemic in certain areas as Sharkia govern rate in Egypt.

Pathology:

a. *Atrophic stage:* as atrophic rhinitis

Atrophy of mucous membrane, blood vessels, nerves, glands and bony turbinates.

b. *Active nodular (hypertrophic) stage:*

Characterized by formation of inflammatory cells especially:

* Russell bodies: degenerated bright red plasma cells.

* Mikulicz cells: large vacuolated foamy cells (macrophage engulfing organism).

It is the diagnostic stage.

c. *Fibrotic stage:* Fibrous tissue formation (collagen bundle and fibroblasts).

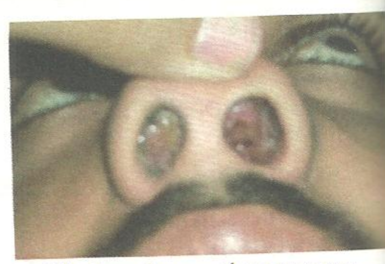
Clinical Picture:

1. **Atrophic stage:** similar to atrophic rhinitis (Symptoms + Signs).

2. **Active nodular stage:**

* Symptoms:
- Bilateral nasal obstruction.
- Bilateral nasal discharge (crusty).

* Signs:
- Bilateral nasal masses mainly at **muco-cutaneous** junction.

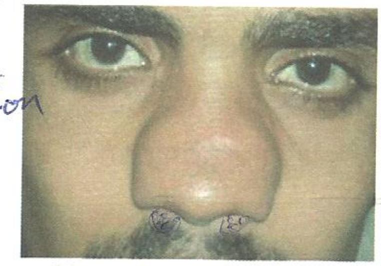


Bilateral nasal masses

3. **Fibrotic stage:**
- Bilateral nasal obstruction (internal fibrosis).
- Deformity (external fibrosis).

Investigations:

1. Biopsy: Mikulicz cells and Russell bodies in active stage.
2. Culture: after mincing of the tissues.
3. Electron microscopic examination.



Hypertrophic stage

Complications:

1. Extension:
- Subcutaneous → ulceration + fibrosis.
- Lacrimal sac → dacryoscleroma.
- Pharynx → pharyngoscleroma.
- Larynx → laryngoscleroma (subglottic area).
2. Fibrosis.
3. Malignant transformation: if treated by radiotherapy.

Treatment:

A. Medical:

1. Rifampicin: 600 mg/day.
Side effects: hepatotoxic + red discolouration of urine.
2. Streptomycin: 1gm I.M./day for 40 days.
Side effects: ototoxic + nephrotoxic.
3. Alkaline nasal douche to dissolve crusts.

B. Surgical: Removal of the masses (better by laser).

N.B. Radiotherapy: Not used nowadays as it is carcinogenic and the condition is benign.

2 Lupus:

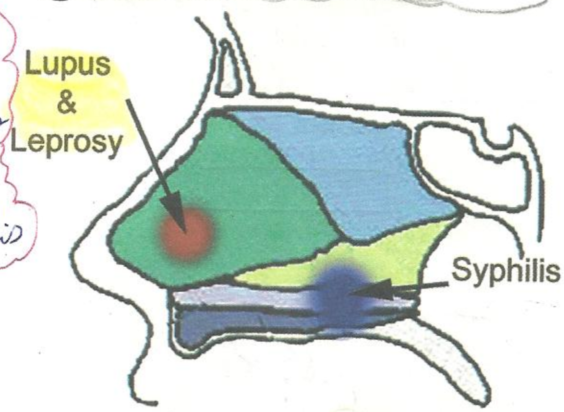
- Caused by attenuated T.B. bacilli.

Site: anterior part of nasal septum (Cartilaginous part) at muco-cutaneus junction.

- Causing **apple-jelly nodule**, which ulcerate lead to perforation in cartilaginous septum.

Treatment

1. Anti-tuberculous: as Rifampicin
2. Alkaline nasal douche.
3. Surgical correction of deformity.



3 Syphilis:

- Caused by treponema pallidum.
- Types:

* Acquired:

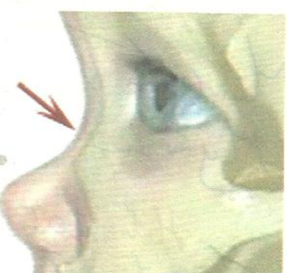
. Primary (chancre): rare: causing nodule.
. Secondary: mucous patches: causing rhinitis.
. Tertiary: gumma.

* Congenital:

. Early: as 2ry syphilis.
. Late: as 3ry syphilis.

Gumma

Site: Posterior bony septum (it is a disease of blood vessels).
Causing perforation in this part; and lead to saddle nose.
It may cause perforation of hard palate.



Saddle nose

Treatment:

1. Anti-syphilitic: penicillin.
2. Alkaline nasal douche.
3. Surgical correction of deformity.

4 Leprosy:

- Caused by mycobacterium leprae.

Site: anterior part of nasal septum (cartilaginous) causing its perforation.

Treatment:

1. Anti-lepromatous: Dapson - Rifampicin.
2. Alkaline nasal douche.
3. Surgical correction of deformity.

5 Fungal infection:

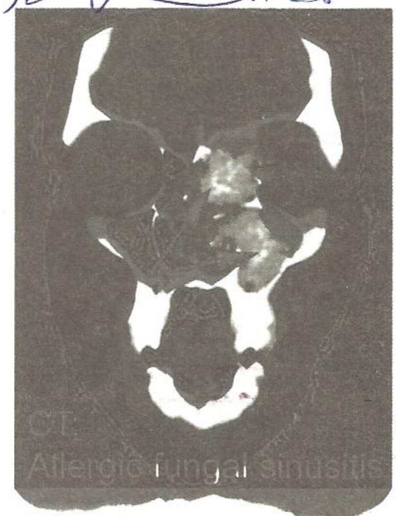
- Occur in patients with low immunity as diabetics.
- Types:

1. **Mycetoma**: mass within the sinus.
2. **Indolent** form: affect mucosa.
3. **Allergic fungal sinusitis:**

* Caused by aspergillus.
* Characterized by: BCG

Bone expansion-Calcification-Greenish discharge.

* It causes polypi (usually unilateral).



CT: Allergic fungal sinusitis

Treatment:

-Anti-allergic: cortisone.

-Anti-fungal: fluconazole.

-Surgical removal of polypi by ESS (Endoscopic Sinus Surgery).

4. **Mucor-mycosis (invasive)**: (Rhino-orbital and Rhino-cerebral)

- It is a fatal disease, occur with uncontrolled diabetes.

Sites:

Nose → Bloody blackish discharge.

Orbit → Proptosis, ophthalmoplegia, chemosis, and diminution of vision.

Cerebral → nerve palsies.



Orbital complications of mucormycosis

Treatment:

- Hospitalization and control of diabetes.
- Anti fungal: Amphotrecin-B, It is hepato and nephrotoxic.
- Surgical debridement.



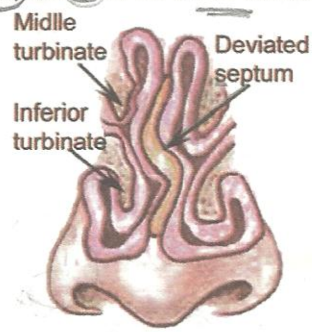
Mucormycosis

Diseases of the Nasal Septum

Deviated Septum

Def.: The septum is rarely in mid-line; it may be deviated to Rt., to Lt or to both sides.

Causes: 1- Developmental. Or 2- Traumatic.



Pathology:

1- Simple deviation:

C-shaped (obstruction of one side)

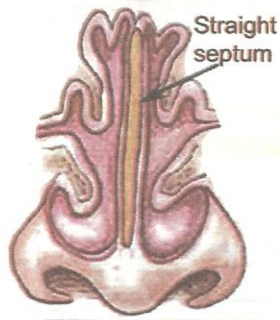
S-Shaped (obstruction of both sides).

2- Deviation with spur:

Sharp angulations at bony-cartilaginous junction.

3- Deviation with dislocation:

Displacement of septum from columella.



Clinical picture:

Symptoms:

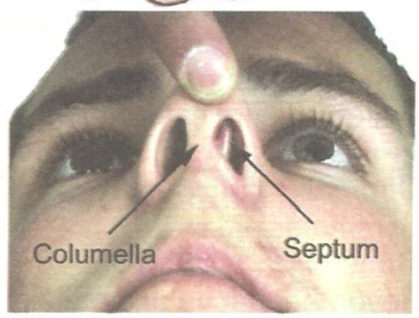
1- Asymptomatic: in mild cases.

2- Nasal obstruction:
- Unilateral in C-shaped deviation.
- Bilateral in S-shaped deviation.

3- Nasal discharge: (ant. and post-nasal); due to contact of medial wall (septum) and lateral wall or sinusitis.

4- Epistaxis: due to angulations of blood vessels.

5- Headache: due to:
- Sinusitis.
- Contact between medial and lateral walls.
- Vacuum headache (obstruction of sinus opening).



Dislocation

Signs:

1- The septum will be seen by anterior rhinoscopy.

2- Sometimes, posterior deviation needs nasal endoscopy.

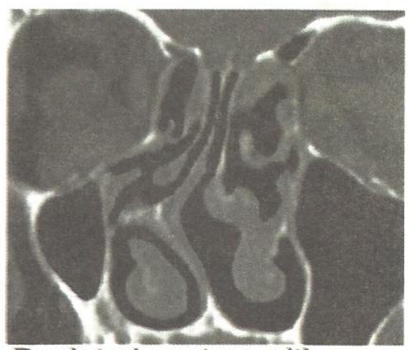
Complications:

1- Recurrent sinusitis (obstruction of sinus opening).

2- Recurrent otits media (obstruction of Eustachian tube).

3- Recurrent pharyngitis (Mouth breathing).

4- 2ry atrophic rhinitis or compensatory hypertrophy of turbinates in wider side.



Deviated septum with spur

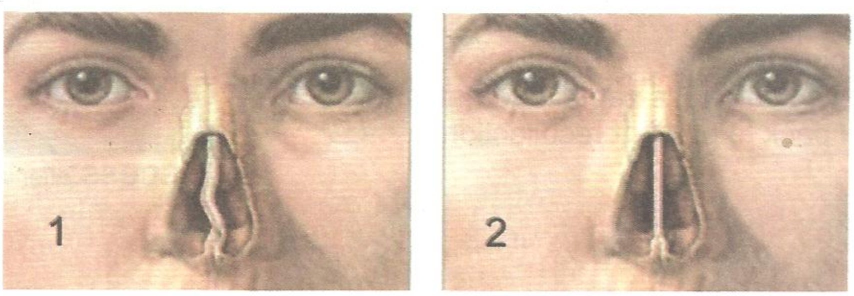
Investigations: X-ray and CT to show the associated sinusitis.

Treatment: Surgical correction by either

a) Sub mucous resection (SMR): after the age of 18 years.

Or

b) Septoplasty: at any age.



Deviated septum: 1. before and 2. after SMR

2 Septal haematoma

Def.: Collection of blood between mucoperichondrium and cartilage of septum.

Causes: Usually traumatic

- Surgical: after SMR or Septoplasty.
- Accidental: associated with fracture nose.

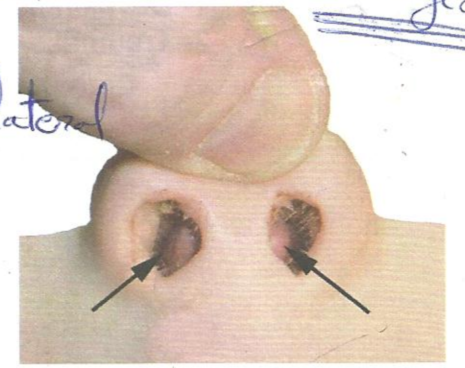
Clinical picture:

Symptoms:

- History of trauma.
- Bilateral nasal obstruction.

Signs:

- Anterior rhinoscopy → bilateral fluctuant swelling on both sides of septum.
- Aspiration → blood



Septal haematoma

Complications: Septal abscess with its complications.

Treatment:

1- Systemic antibiotics to prevent 2ry infection.
2- Incision and evacuation: Vertical incision on one side and horizontal on the other, to avoid septal perforation.
3- Anterior nasal pack to prevent recollection.

3 Septal Abscess

Def.: Collection of pus between mucoperichondrium and cartilage of the septum.

Causes:

- Infected haematoma.
- Infected surgical wound.
- Furuncle.

Clinical Picture:

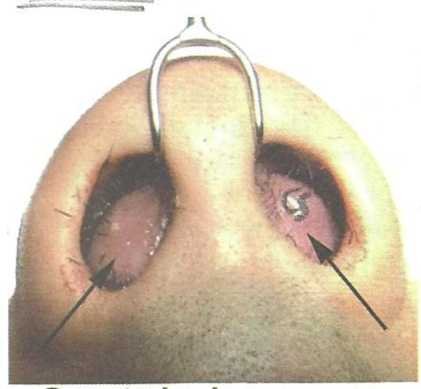
Symptoms:

General:

Fever, headache and malaise.

Local:

- Pain become throbbing on abscess formation.
- Bilateral nasal obstruction.
- Purulent nasal discharge after rupture of the abscess.



Septal abscess

Signs:

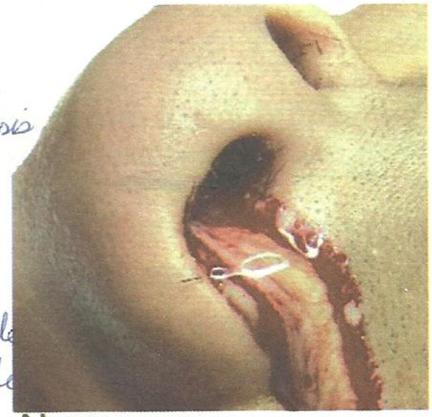
- Anterior rhinoscopy → Bilateral fluctuant tender swelling on both sides of the septum.
- Aspiration → pus

Complications:

- Cavernous sinus thrombosis.
- Necrosis of septal cartilage → perforation of septum and supratip depression.

Treatment:

1- Systemic antibiotics.
2- Incision and evacuation (as septal haematoma).
3- Anterior nasal pack to prevent recollection.



Abscess: after incision of one side

Septal Perforation

Never by Rhinoscleroma

Causes:

1- Traumatic:

- Surgical:

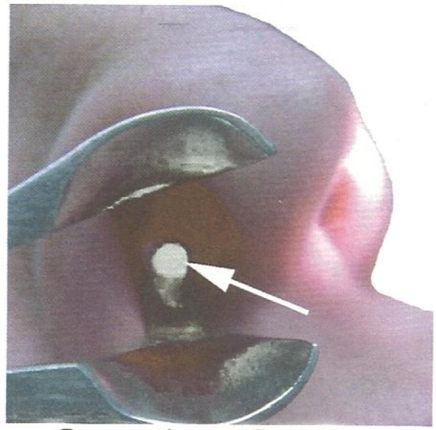
SMR and Septoplasty (more in SMR).
Cauterization if done bilaterally in the same time.

- Accidental:

Nose picking → localised perichondritis.
Penetrating injury.

2- Inflammatory:

- Acute → Septal abscess.
- Chronic
  - Lupus → (cartilaginous).
  - Leprosy → (cartilaginous).
  - Syphilis → (bony).



Septal perforation

3- Neoplastic: Malignant tumour.

4- Toxic:

Cocaine addiction → ischemia (severe vasoconstriction).

Clinical picture:

- It may be asymptomatic.
- Epistaxis and crusty discharge.
- Whistling sound during respiration.



Treatment:

- Medical:

Repeated alkaline nasal douche.
Closure of the perforation by an obturator (button like).

- Surgical:

Closure of the perforation by temporalis fascia graft or mucosal flap from the surrounding area (with no good results).

Diseases of the Paranasal Sinuses

A Acute Sinusitis

Def.: Acute inflammation of the mucosal lining of the sinuses, usually associated with rhinitis, so it is called **Rhinosinusitis** (one or more of the sinuses may be affected).

Causes:

Causative organism: Strept. Pneumonia.
Hemophilus influenza.
Moraxella catarrhalis.

N.B.: Sinusitis of dental origin → anaerobic infection lead to offensive discharge

Predisposing factors:

General → Low resistance and overcrowdness.

Local → deviated septum and allergic rhinitis (obstruction of sinus ostium).

Routes of infection:

a) Nasal:

- Extension of infection:

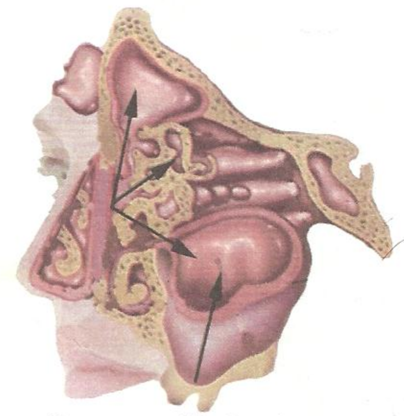
Starts by viral infection (Rhinitis) (as common cold) then 2ry bacterial infection.

- Passage of infected material

FB in nose.
Nasal pack
Nasogastric tube
Infected water.

b) Dental: dental caries or oro-antral fistula.
Lead to maxillary sinusitis.

c) External: Fracture maxilla reaching to the sinuses (rare)



Routes of infections

Pathology:

1- Catarrhal sinusitis: congestion and oedema of mucosa lead to obstruction of sinus drainage (viral).

2- Suppurative sinusitis: accumulation of pus within the sinuses (bacterial)

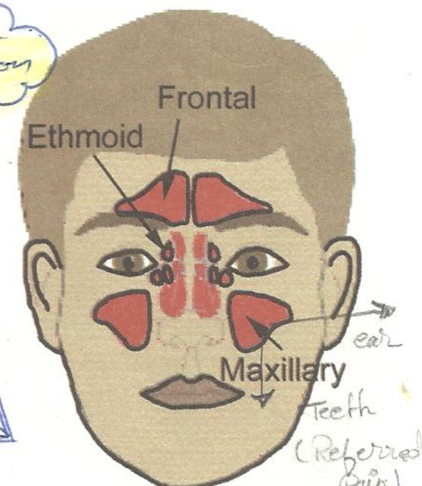
Clinical picture:

Symptoms: History of common cold is usually present.

General: Fever, headache and malaise.

Local:

- Nasal obstruction (unilateral or bilateral)
- Nasal discharge (unilateral or bilateral, mucopurulent):
The discharge is anterior and posterior nasal.
- Facial pain and headache:
a- Its site over the affected sinus.
b- Increased by coughing, straining and leaning forwards.
c- More severe in the morning.



Site of pain in sinusitis

Signs:

General: High temperature and rapid pulse.

Local:

- Inspection: Oedema and redness (occur only with complications).
- Palpation: Tenderness over the affected sinus.
- Anterior rhinoscopy and nasal endoscopy:
a) Congestion and oedema of nasal mucosa.
b) Mucopurulent discharge in:

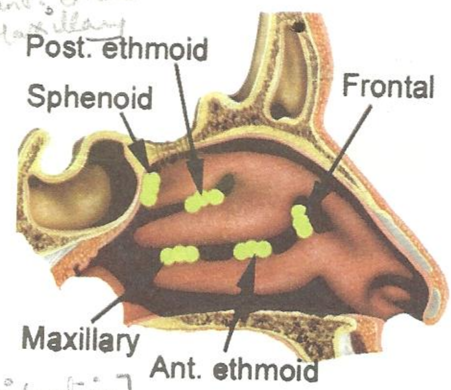
Endoscopy ⇒ Mucopurulent discharge on:

Middle meatus → sinusitis of anterior group. ← frontal and ethmoid + maxillary

Superior meatus → sinusitis of posterior ethmoid.

Sphenoethmoidal recess → sphenoidal sinusitis.

- Posterior rhinoscopy: Post-nasal mucopurulent discharge.



N.B.:

1 Acute maxillary sinusitis:

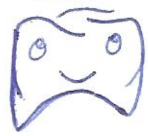
post. of mid. meatus

Symptoms:

- History of dental problems may be present.
- The nasal discharge is offensive [anaerobic infection]
- Facial pain: over the cheek referred to the teeth and ear.

Signs: site Key

- Palpation: Tenderness over the cheek.
- Ant. rhinoscopy and nasal endoscopy: Discharge in posterior part of middle meatus.
- Oral examination may show dental problem.





2 Acute frontal sinusitis:

ant. of mid meatus

Symptoms:

- Facial pain: over the forehead (Vacuum headache, due to -ve pressure in the sinus). Key

N.B. the pain has characteristic periodicity starts in the morning → ↑ by mid-day → ↓ gradually by end of day. at end of day

Signs:

- Palpation: Tenderness over the forehead and floor of sinus.
- Ant. rhinoscopy and nasal endoscopy: discharge in anterior part of middle meatus.

3 Acute ethmoidal sinusitis (Ethmoiditis):

Commonest source of inf.

Symptoms: (ant.) → mid. of mid meatus; (Post.) → superior meatus

- Facial pain:

Over the inner canthus → anterior ethmoidal sinusitis.

Retro-orbital → posterior ethmoidal sinusitis.

Signs:

- Palpation: Tenderness over the inner canthus. ☆ Key
- Anterior rhinoscopy and nasal endoscopy:

Discharge in middle meatus → anterior ethmoidal sinusitis.

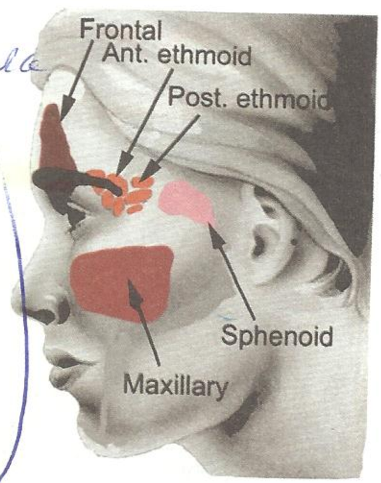
Discharge in superior meatus → posterior ethmoidal sinusitis.

N.B.: Complications are common with ethmoiditis in children due to:

1- Thin lamina paparycea.

2- ↓ immunity.

N.B.: Infection usually starts in the ethmoid, then spread to other sinuses.



4 Acute sphenoidal sinusitis:

Sphenoethmoidal Recess.

Symptoms:

- Facial pain: retro-orbital referred to the occipital region. Key

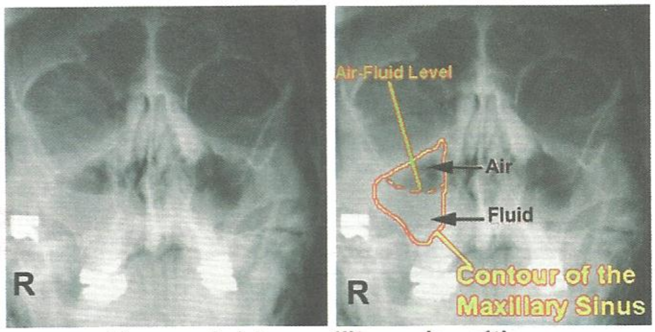
Signs:

- Ant. rhinoscopy and nasal endoscopy: discharge in sphenoethmoidal recess.

Investigations:

- X-ray (sinus view):
shows opacity or fluid level
- Culture and sensitivity of discharge.
- CT (in recurrent cases).

N.B.: Trans-illumination (not used nowadays): shows opacity of affected frontal or maxillary sinuses.



X-ray: right maxillary sinusitis

Treatment:

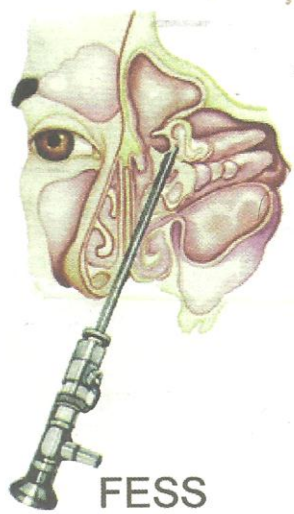
a) Medical:

- General:
  * Complete bed rest with plenty of warm fluids.
  * Systemic antibiotics
  * Analgesic - antipyretics.
  * Mucolytics.
- Local:
  * Decongestant nasal drops as Xylometazoline.
  * Steam inhalation.
  * Warm fomentations over the affected sinus.

b) Surgical:

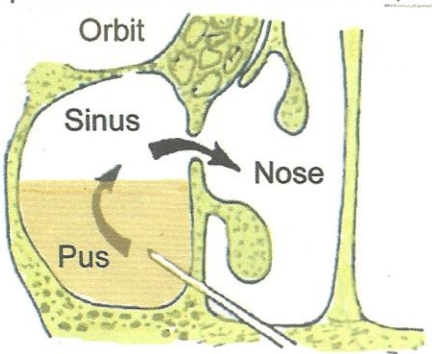
Indications: Failure of medical treatment.
Complicated sinusitis.

Nowadays **FESS** (Functional Endoscopic Sinus Surgery): is the standard surgical treatment for recurrent sinusitis; in which the diseased mucosa is removed while the healthy mucosa is preserved with restoration of sinus opening.

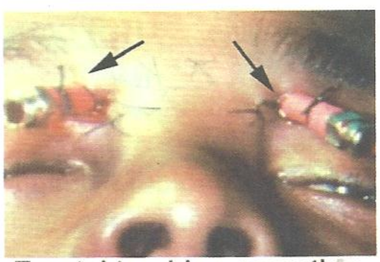

FESS

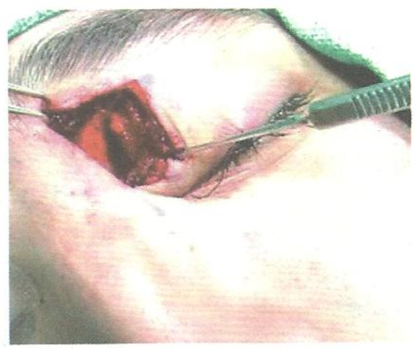
Old Procedures:

Maxillary sinusitis: Antral puncture and lavage
Frontal sinusitis: Trephine operation (through the floor and placement of tube).
Ethmoidal sinusitis: External ethmoidectomy.
Sphenoidal sinusitis: External spheno-ethmoidectomy.



Antral puncture and lavage


Frontal trephine operation


External ethmoidectomy

All these procedures became obsolete and were replaced by FESS.

B Chronic Sinusitis

Def.: Chronic inflammation of mucoperi-osteal lining of the sinuses with irreversible pathological changes.

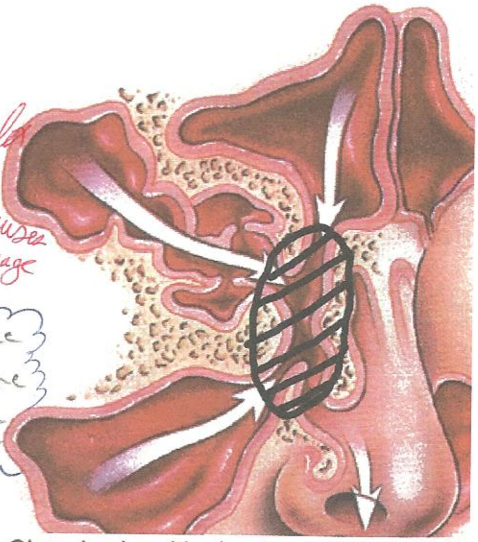
Causes: Acute sinusitis → chronic sinusitis due to:

1- ↓ Treatment due to:
- Ineffective antibiotics.
- Short course of antibiotics.
- Inadequate drainage.

2- ↑ Virulence of organism.
3- ↓ Resistance of the patient.

Pathology: Oedema and congestion of mucosa → loss of cilia with submucosal pathological changes either atrophic or hypertrophic.

N.B.: The region of OMC is Key area of sinuses, if obstructed → infection of ant. group of sinuses.



Chronic sinusitis due to occluded OMC

Clinical picture:

Symptoms:

1- History of recurrent acute attack.
2- Nasal obstruction (unilateral or bilateral).
3- Mucopurulent nasal discharge (unilateral or bilateral): ant. and post-nasal.
4- Facial pain and headache:
a) Its site over the affected sinus.
b) ↑ By coughing, straining and leaning forewords.
c) It is more severe in the morning.
5- Symptoms of septic focus.
6- Symptoms of descending infection



Signs:

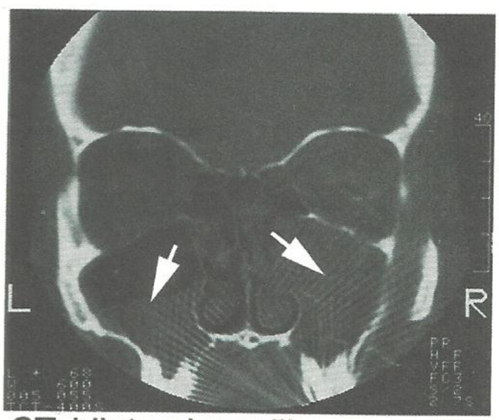
- Palpation: Tenderness on deep pressure over the affected sinus.
- Ant. rhinoscopy and nasal endoscopy:
Congestion and oedema of nasal mucosa.
Mucopurulent discharge in:
  - Middle meatus (anterior group).
  - Superior meatus (posterior ethmoid).
  - Spheno-ethmoidal recess (sphenoid).

N.B.: Nasal polypi may be seen in chronic ethmoid sinusitis.
- Posterior rhinoscopy: post-nasal discharge.

N.B.: Nasal endoscopy: is important to detect the cause of chronicity.

Investigations:

As acute sinusitis but CT is mandatory as a pre-operative investigation to detect any anatomical abnormality such as low cribriform plate, dehiscent carotid or optic nerve.



CT: bilateral maxillary sinusitis

Treatment:

a) Medical:
-Systemic antibiotics according to culture and sensitivity.
-Analgesics.
-Mucolytics.
-Decongestant nasal drops as xylometazoline (but don't use it for long time→ Rhinitis medicamentosa).
-Steam inhalation.
-Treatment of the predisposing factors.

b) Surgical:
Indications:
Failure of medical treatment.
Complicated sinusitis.

FESS is the recent standard surgical treatment.

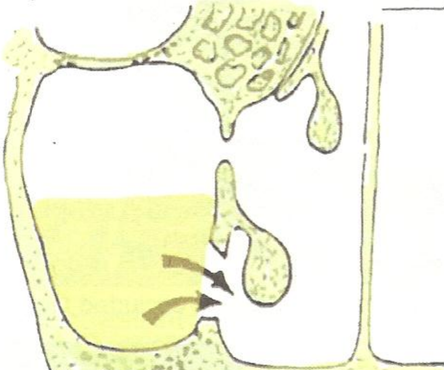
Old Procedures:

1) Maxillary sinusitis:
- Repeated antral puncture and lavage.
- Intra-nasal inferior antrostomy.
- Cald-well Luc (radical antrum) operation: removal of antral mucosa.

2) Frontal sinusitis: Osteoplastic flap operation in which the sinus is obliterated by fat.

3) Ethmoidal sinusitis: External ethmoidectomy.

4) Sphenoidal sinusitis: External sphenoethmoidectomy.



Inferior antrostomy
(a hole below inf. turbinate)



Caldwell-Luc operation
(removal of atnt. wall and cleaning the sinus)

C Sinusitis in Children

Maxillary or ethmoid sinusitis only as other sinuses are not still developed.

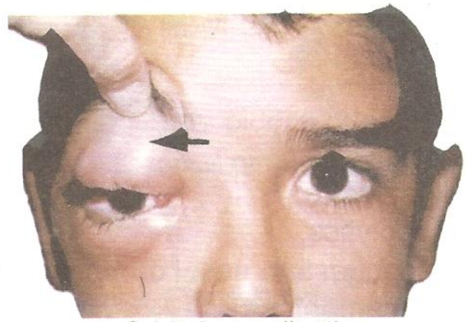


Predisposing factors:
- General:
  1-Repeated upper respiratory tract infection, and Exanthemata.
  2-↓Mucociliary clearance by cystic fibrosis (viscid mucus) or Kartagner's syndrome (immotile cilia).
  3- Low general resistance.
- Local: adenoid → stagnation of mucus.

Causative organism: Hemophilus influenza, Strept. pneumonia and/or Moraxilla catarrhalis.

Clinical picture: the same as adult with

Acute sinusitis:
- Fever is more severe in children.
- Oedema at the root of the nose and between eyes may be present.
- Complications (orbital) are more common.



Orbital complication

Chronic sinusitis:
- Persistent mucopurulent discharge.
- Symptoms of descending infection: pharyingitis and OM.

Treatment:

a) Medical: in most cases.

b) Surgical: In complicated cases or failed medical treatment; consists of FESS ± adenoidectomy.

" اليوم اي سعتم صوته فلا تقسوا قلوبكم "
+

Complications of Sinusitis

Def.: Extension of infection beyond the muco-periosteal limit of the sinuses.

Causes:

1- Acute sinusitis especially in children.
2- Acute exacerbation on top of chronic sinusitis.

Types:

A) Orbital complications: The commonest

1- Orbital oedema.
2- Orbital cellulites.
3- Extra-periosteal abscess.
4- Intra periosteal abscess. → diminution of vision irreversible
5- Cavernous sinus thrombosis.

N.B.: Posterior group of sinuses may lead to:

1- Optic neuritis.
2- Superior orbital fissure syndrome. [structures] → ophth. ... III, IV, V N.
3- Orbital apex syndrome.



Orital cellulitis

B) Cranial complications:

1- Osteomyelitis (frontal, rarely maxillary).
2-Fistula (after rupture of subperiosteal abscess).

C) Intracranial complications:

1- Extradural abscess.
2- Subdural abscess.
3- Meningitis.
4- Brain abscess (frontal lobe).
5- Cavernous sinus thrombosis.

D) Others:

1- Descending infections:
- Upper respiratory infections: pharyngitis and laryngitis.
- Lower respiratory infections: bronchitis and bronchopneumonia.
- Ears: otitis media.

2- Mucocele
3- Septic focus.

A Orbital Complications [most Common] [Ethmoidal Sinus]

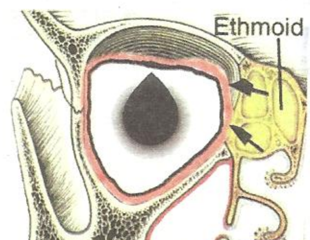
The ethmoid sinus is the commonest source for orbital complications as it is separated from the orbit by thin plate of bone called lamina paparycea (sometimes → dehiscent)

Clinical picture: 5 stages

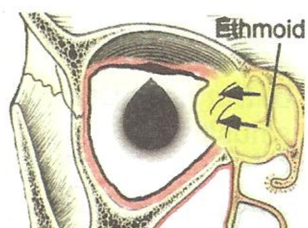
1- Orbital oedema: due to venous obstruction.
Oedema of upper eyelid.

2- Orbital cellulites: No pus formation.
- Oedema of upper eye lid.
- Pain in the eye.
- Chemosis.
- Proptosis.
- Ophthalmoplegia.
- Reversible diminution of vision. ★ خد بالك

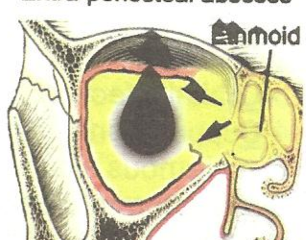
3- Extraperiosteal abscess: Collection of pus outside the orbital periosteum.
As above but pain become throbbing.



Orbital cellulites



Extra-periosteal abscess



Orbital abscess

WhiteKnightLove

Extra → throbbing pain "يرسل ملاكه وينجح طريقك"
Intra → irreversible diminution

4- Intra periosteal abscess (orbital abscess): Collection of pus within the orbit due to periosteal rupture.
As above but the diminution of vision become Irreversible.
5- Cavernous sinus thrombosis:
Extension of thrombosis to cavernous sinus through the ophthalmic veins.

Investigations:
- Urgent CT
- Fundus examination

Treatment:
a) Medical:
-Hospitalization.
-Systemic antibiotics.
-Steroids: given if there is diminution of vision.
b) Surgical:
- Indications
  - Failed medical treatment for 48 hours.
  - Abscess formation.
  - Diminution of vision.
- Approach: External approach is used (external frontoethmoidectomy) to allow profuse drainage. Endoscopic approach (ESS) may be tried.

N.B.: Posterior group of sinuses may lead to:
1- Orbital apex syndrome: Affection of structures passing through the superior orbital fissure and optic foramen.
Ophthalmic vein → oedema of upper eyelid.
Ophthalmic nerve of 5th → pain in forehead.
3,4,6 cranial nerves → ophthalmoplegia + proptosis.
Optic nerve → diminution of vision.
2- Superior orbital fissure syndrome: affection of structures passing through the superior orbital fissure only i.e. No diminution of vision.
3- Optic neuritis.

No affection of optic N.

B Osteomyelitis of frontal bone
[Cranial Complication]
Frontal common / Maxillary rare

Symptoms:
- Pain and swelling of forehead.
- Discharging fistula after rupture of subperiosteal abscess.

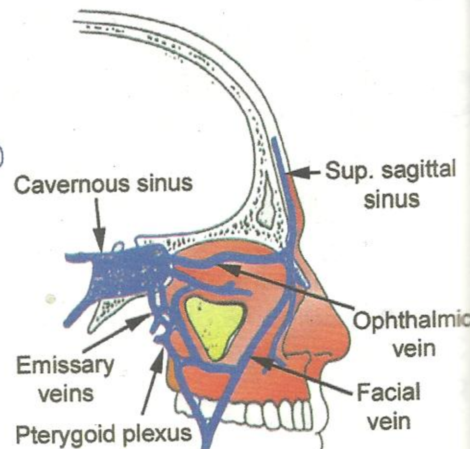
MCQ

Signs:
Tender fluctuant swelling of the forehead (Subperiosteal abscess = Pott's puffy tumour).
Investigations: CT is diagnostic.
Treatment:
a) Medical: Hospitalization and Systemic antibiotics.
b) Surgical: Drainage of abscess and treatment of sinusitis.

[intra Cranial Complication]



C Cavernous Sinus Thrombosis:
Causes: Spread of infection from SOS
1-**S**kin sepsis in the dangerous triangle.
2-**S**inusitis.
3-**O**rbital infection.
4-**S**uppurations of the pharynx: through emissary vein to cavernous sinus
5-**S**inus thrombophlebitis complicating CSOM (lateral sinus): through petrosal sinuses.



Clinical picture:

1. General: Fever, headache and malaise.
2. Local:
   - a) Oedema of upper eyelid.
   - b) Chemosis.
   - c) Proptosis (pulsating).
   - d) Ophthalmoplegia.
   - e) Diminution of vision → blindness.



Cavernous sinus thrombosis

Investigations:

- CT with contrast.
- MRA (MR Angiography).

Treatment:

a) Medical:
- Hospitalization.
- Systemic antibiotics (I.V.) that cross the blood brain barrier.
- Anticoagulants as heparin.

b) Surgical:

Treatment of infected sinuses after recovery.

Miscellaneous Lesions

Allergic Rhinitis

Def.: Hypersensitivity of sinu-nasal mucosa (mediated by IgE) to antigenic materials characterized by **recurrent attacks** of



- **-Sneezing**
- **-Itching**
- **-Rhinorrhoea** (bilateral, watery).
- **-Nasal obstruction** (bilateral).

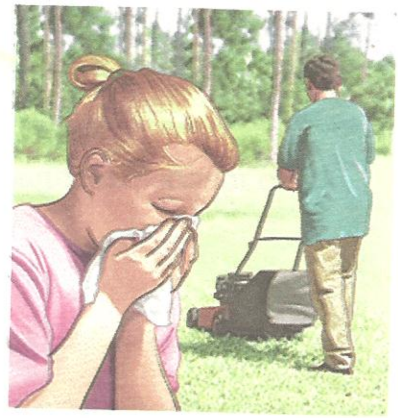
Types:

1- Seasonal: as hay fever.
2- Perennial: all round the year.
3- Perennial with seasonal exacerbations.

Causes:

- Predisposing factors:

1- Genetic: 50% of Allergic patients' give +ve family history.
2- Physical: change in temperature.
3- Emotional: the attacks may be related to anxiety.



- Exciting factors: exposure to the antigen, which may be

1- Inhalants: * Pollens in Seasonal Rhinitis.
* House dust in Perennial Rhinitis.
2- Ingestants: as fish, milk and eggs.
3- Injectants: as penicillin.
4- Infectants: as fungal infection (Allergic fungal sinusitis).
5- Contactants: as face powder.

Mechanism (Pathogenesis):

- Exposure to the antigen (1st time) → formation of IgE antibodies, which become fixed to the mast cells of nasal mucosa.
- Re-exposure to the same antigen → the antigen will react with the antibodies (IgE) on the mast cells lead to degranulation and release of chemical mediators as histamine, serotonine and leukotrines.
- The actions of chemical mediators are:

1- Vasodilatation and increased capillary permeability.
2- Increased secretions by seromucinous glands.
3- Oedema of mucous membrane.
4- Smooth muscle contraction.
5- Cellular infiltrations in the form of eosinophils.



Clinical picture:

Symptoms:

- Recurrent attacks of: Itching; sneezing; rhinorrhoea (bilateral watery nasal discharge); nasal obstruction (bilateral).
- Other allergic manifestations: as allergic conjunctivitis, bronchial asthma or eczema.

Signs:

-The nasal mucosa may be normal.
-The mucosa may be oedematous and pale bluish during the attack especially of turbinates that may be enlarged.
-Nasal polypi: may be present, coming from the ethmoid and passing through the middle meatus to nasal cavity.

Investigations:

1-Nasal Cytology → eosinophils.

2-Nasal **C**hallenge test: Inhalation of the antigen→Allergic manifestations.
3-**S**kin prick test → +ve test detected by the development of central wheel surrounded by erythema.
4- **S**erum IgE is elevated.
5- **R**AST (Radio-allergo-sorbant test): Application of the antigen to the patient's serum (contain antibodies) lead antigen-antibody reaction.

Treatment:

A) Avoid exposure to the causative antigen.

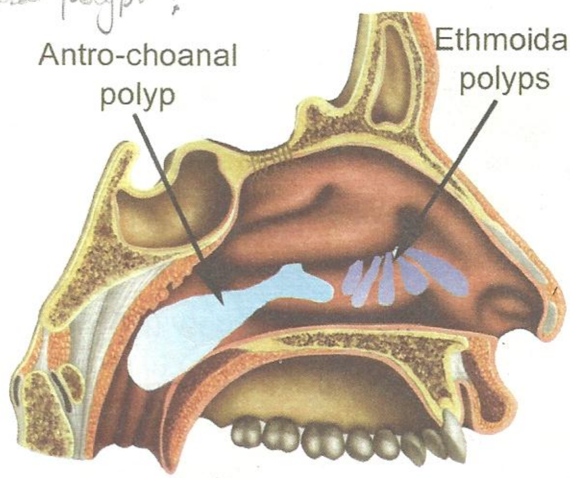
B) Medical treatment:
- Antihistaminic: as Loratidine.
- Local decongestant nasal drops as Xylometazoline but prolonged use should be avoided (to avoid rhinitis medicamentosa).
- Cortisone: either local nasal spray (Beclomethazone) or systemic (Dexamethazone).
- Mast cell stabilizers: as Ketotifen.

C) Hypo sensitization:
Injection of gradually increasing doses of the causative antigen→production of blocking antibodies (IgG), which bind to the antigen (on exposure) instead of IgE.

D) Surgical treatment: for obstruction
1- Reduction of enlarged inferior turbinates (as in hypertrophic rhinitis).
2- Removal of polyps by endoscopic sinus surgery (ESS).

Nasal Polyps

Def.: Pedunculated oedematous mucosa prolapsed through middle meatus to the nasal cavity [either from the ethmoid → ethmoidal = Allergic polyps or from maxillary antrum = Antro-choanal polyp].



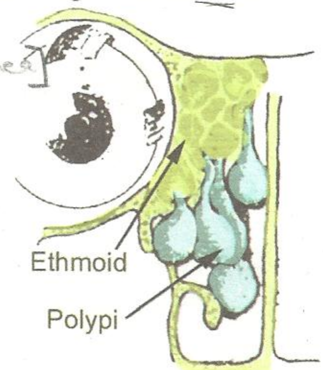
Causes:
1- Allergic rhinitis: associated with other allergic manifestations.
2- Inflammatory: ethmoidal sinusitis.
3- Both the above (allergic + inflammatory).
4- Allergic - Fungal sinusitis: allergy against fungal antigen.

Allergic (ethmoidal) Polyps:

Def.: Pedunculated oedematous mucosa of the ethmoid prolapsed through the middle meatus to the nasal cavity.

Clinical picture:

Symptoms:
- Symptoms of allergic rhinitis but the obstruction is persistent.
- It is a predisposing for sinusitis lead to
Facial pain and headache
Mucopurulent discharge.



Signs:
Anterior rhinoscopy: bilateral multiple glistening, pale bluish, soft, mobile and insensitive polypi coming from the middle meatus.

Investigations:
CT is very important before the operation to detect any anatomical abnormality.

"you cannot keep trying to do things the same way & expect different results"

Treatment: of ethmoidal polyp

Before operations → CT → anatomical ab.
After → Steroid Nasal Spray → ↓ Recurrence

1) Medical treatment:

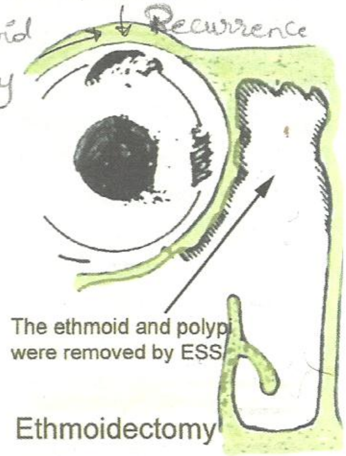
Anti-allergic treatment (steroid and antihistaminic).
Antibiotics for infection.

2) Surgical treatment:

a. Nasal polypectomy: avulsion by snare (high recurrent rate).
b. Ethmoidectomy: by ESS (the standard surgical treatment).

N.B.: Post-oeprative steroid spray is given to decrease the recurrence.

N.B.: The ethmoid is the source of polypi, as their mucosa is loosely attached and descends by gravity.



Ethmoidectomy

Antro-choanal polyp:

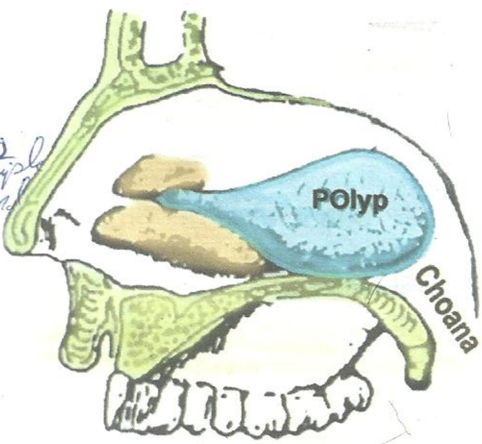
Def.: Pedunculated oedematous mucosa of maxillary antrum prolapsed through middle meatus to the nasal cavity then posteriorly to the nasopharynx passing from the choana.

Cause: Unknown, may be inflammatory as there is no oesinophils in the polyp

Clinical picture:

Symptoms:
- Unilateral nasal obstruction.
- Unilateral nasal discharge.

Signs:
-Anterior rhinoscopy: single, unilateral, pale bluish, soft, and jelly - like polyp.
-Posterior rhinoscopy: The polyp may be seen in the nasopharynx passing from the choana.



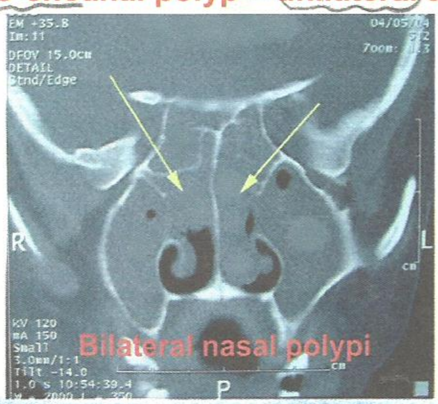
Investigations:

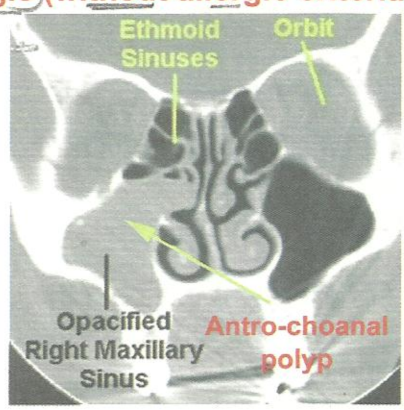
- X-ray → unilateral maxillary opacity.
- CT → is diagnostic.

Treatment:

1- Endoscopic sinus surgery (ESS) and removal of the polyp.
2- Radical antrum operation (if recurrent after ESS).

N.B.: Allergic polyps = bilateral and multiple (with allergic criteria)
While Antro-choanal polyp = unilateral and single (without allergic criteria).





Vasomotor Rhinitis (Intrensic Rhinitis)

Def.: Non-allergic perennial rhinitis due to disturbance of autonomic nerve supply of the nose (parasympathetic part).

Clinical picture: similar to allergic rhinitis

Treatment:
A) Medical: Local cortisone (nasal spray) may be tried.
B) Surgical: Reduction of enlarged inferior turbinates ± Vidian nerve neurectomy.

"Cast all your anxiety on him Because he cares for you"

Tumours of the Nose and Sinuses

A Benign Tumours

(1) osteoma (2) papilloma (3) hemangioma

1 Osteoma

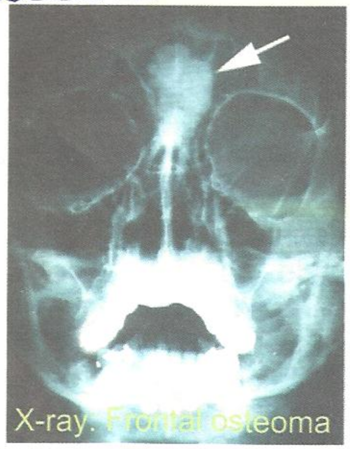
The commonest benign tumour of nose and sinuses in Arab population.

Site: frontal, ethmoid or fronto-ethmoid.

Types:

1- Ivory: from compact bone (Frontal).

2- Cancellous: from cancellous bone (Ethmoid).



X-ray: Frontal osteoma

Clinical picture:

Symptoms:

- Asymptomatic (if small)
- Facial pain and headache
- Swelling and proptosis

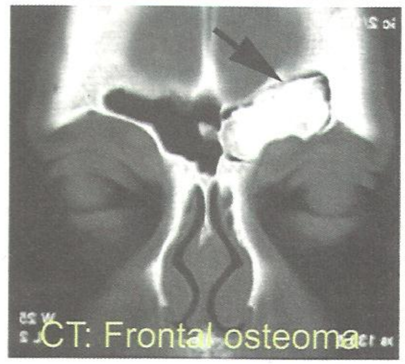
Signs:

- hard-bony swelling at the inner canthus or above the medial half of the eye (or both).
- Proptosis.

Investigations:

X-ray → Radio-opaque mass.

CT → To show site, size and extension.



CT: Frontal osteoma

Treatment:

Surgical excision in symptomatic cases by either :

- External frontoethmoidectomy operation.
- ESS may be tried. (endoscopic sinus surgery)

2 Papilloma

A) Squamous cell papilloma:

Site: Skin of vestibule.

Clinical picture:

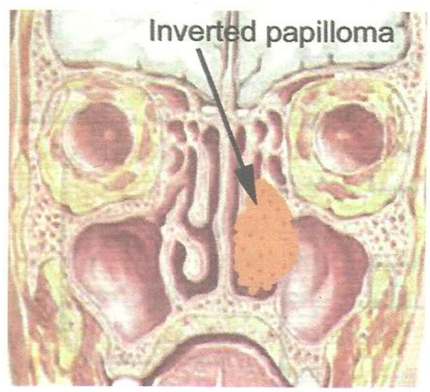
- Symptoms: Unilateral nasal obstruction.
- Signs: Unilateral nasal mass.

Treatment: Excision either surgical or laser.

B) Inverted papilloma (Schniederian or Transitional cell papilloma).

It is a benign but locally destructive.

Site: Arises from lateral wall of the nose at the junction between st. sq. epith. and respiratory epith. (Schniederian membrane).



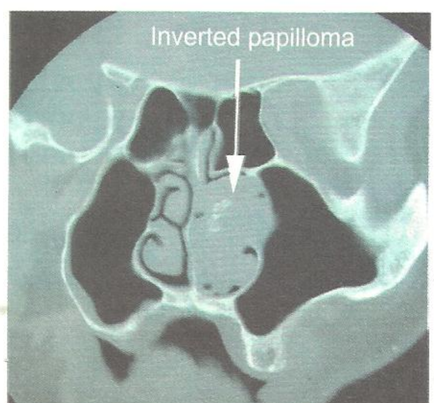
Clinical picture:

Symptoms: Unilateral nasal obstruction, discharge and sometimes epistaxis.

Signs: Unilateral nasal mass arising from lateral wall of the nose.

Investigations:

- CT to show site, size and extension.
- Biopsy.



Treatment:

Excision by medial maxillectomy either external (lateral rhinotomy) or endoscopic.

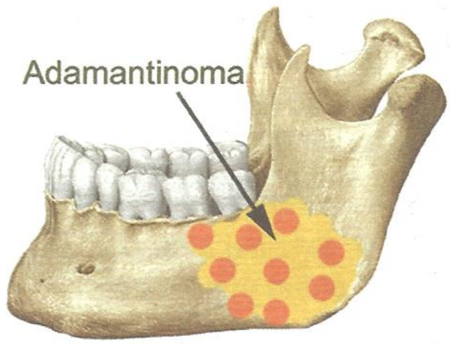
Prognosis:

Recurrence may occur and malignant transformation is 5-10%.

3 Haemangioma:
It may be capillary, cavernous haemangioma or multiple telengectasia.
Treatment: excision (surgical or laser).

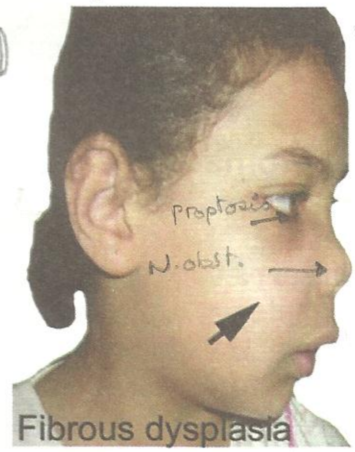
B Locally malignant tumours

1 Adamantinoma:
Origin: residues of dental lamina, more in mandible than maxilla.
Clinical picture:
Symptoms:
-Facial pain and swelling
-Loosening of teeth, and pathological fracture of mandible.
Signs: Swelling with eggshell crackling sensation on palpation.
Investigations:
- X-ray and CT show multiple cysts.
- Biopsy.
Treatment: Surgical excision.



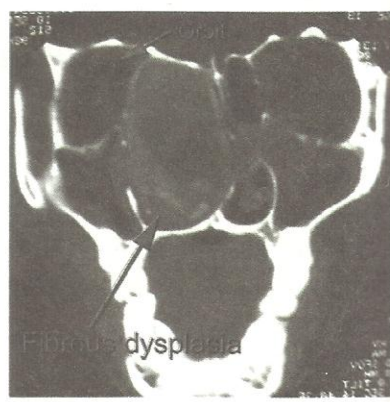
2 Osteoclastoma:
It is locally malignant tumour give the soap bubble appearance in X-ray.

3 Fibrous dysplasia: (not a true tumour).
Replacement of normal bone by woven bone and fibrous tissue.
Age: Teen-agers with arrest of growth at sexual maturity.
Site: Mandible and maxilla.
Types:
- Monostotic: one bone is affected.
- Polystotic: more than one bone.
- Albright syndrome: more in females with unilateral polystotic fibrous dysplasia, skin pigmentation and endocrinal manifestations (as precocious puberty).



Clinical picture:
Symptoms:
- Facial swelling which is painless and slowly growing.
- Nasal obstruction, if it encroaches on nasal cavity.
- Proptosis, if it encroaches on the orbit.

Signs: hard, ill defined, diffuse swelling, which is not tender.
Investigations:
X-ray → ground glass appearance (characteristic).
CT → Size and extension.
Treatment: Surgical excision (just shaving) after the age of sexual maturity.

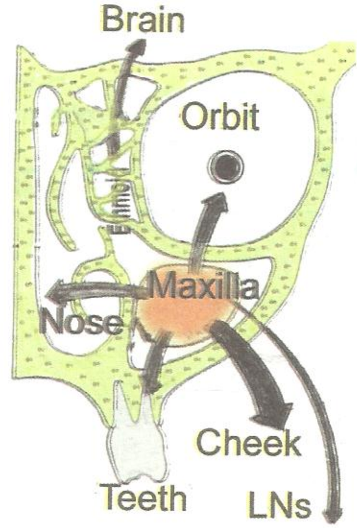


C Malignant Tumours
- Age: Old (above 60 years).
- Sex: More in males.
- Predisposing factors:
  - Exposure to nickel → sq. cell ca.
  - Exposure to wood dust → adenocarcinoma.
  - Irradiation.
  - Smoking.

- **Pathology:**

Gross Picture:
- Shape: Ulcer, Cauliflower or Nodular infiltrative.
- Sites:

Maxillary sinus: 60%
Nasal cavity: 30%
Ethmoid sinus: 10%



Microscopic Picture:
- Squamous cell ca.: 80% (commonest).
- Adenocarcinoma: rare.
- Sarcoma: rare (in young age).
- Olfactory neuroblastoma: roof of the nose.

Spread:
a) Local spread as in clinical picture.
b) Lymphatic spread: in 15% of cases:
-Anterior group of sinuses to submandibular, then to upper deep cervical LNs.
-Posterior group of sinuses: to retropharyngeal then to upper deep cervical LNs.
c) Blood spread: B.B.L.L. [Bone, Brain, lung, liver] LBLB

Prognosis: bad due to the close relation to the orbit and brain.

- **Clinical Picture:**

- Symptoms:

Manifestations of the primary tumour: Unilateral nasal obstruction, discharge and epistaxis especially in old patient who is not hypertensive should be well investigated.


Malignant tumour of the left maxilla

Manifestations of local spread:
-Downwards: unilateral dental pain, loosening of teeth, and/or oro-antral fistula.
-Upwards: proptosis, diplopia, ophthalmoplegia and diminution of vision.
-Posterior: trismus (by infeltration of pterygoids), and anaesthesia (by infeltration of maxillary nerve). → Contraction of Ms. of Mastication
-Anterior: facial pain, swelling and ulceration.
-Medially: to nasal cavity, unilateral nasal obstruction, discharge and epistaxis.

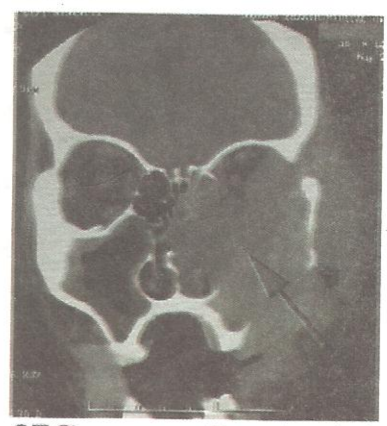
N.B.: Tumours of ethmoid and roof the nose:
Presents early with anosmia, proptosis and CSF rhinorhoea. (Roof)

Manifestations of lymphatic spread: present in about 15% of cases.

Manifestations of blood spread: B.B.L.L.
-Lung: cough, hemoptysis and chest pain.
-Liver: abdominal pain, jaundice and ascitis.
-Bone: bony aches and pathological fracture.
-Brain: ↑ICT

- Signs:

Anterior rhinoscopy: unilateral nasal mass, which is friable and it bleeds on touch.
Examination of the neck: to exclude lymph node metastasis.
General examination: to exclude distant metastasis.

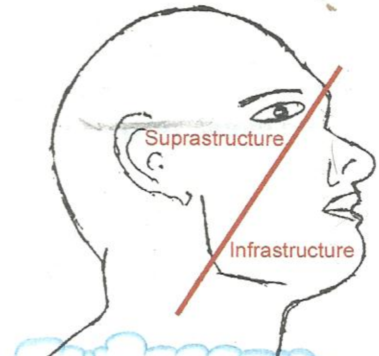

CT:Cancer maxilla extended to nasal cavity and orbit

- **Investigations:**

-CT → site, size, extension, bone destruction and detect L.Ns.
-MRI → to detect intra-cranial and intra-orbital extension.

"الحجر الذى رفضه البناءون هذا قد صار رأساً للزاوية"

-Biopsy→ by nasal endoscopy under local anaesthesia.
-Metastatic work up: Lung: chest X-ray.
Liver: ultrasonography.
Bone: bone scan.
-Routine pre-operative investigations.



Ohngren's classification

◆ Classification:

Ohngren's classification:

Oblique line passing from inner canthus to angle of mandible will divide the face into two regions:

-Suprastructure → bad prognosis (near orbit and brain)
-Infrastructure → good prognosis (away from orbit and brain).

◆ Treatment:

Combined treatment i.e. surgery and radiotherapy are used

* Curative:
  - Surgery.
  - Post-operative radiotherapy.
  - Chemotherapy may be used.
* Palliative:
  - Pain killers (analgesics).
  - Palliative surgery.
  - Palliative radiotherapy and chemotherapy.

N.B.: Palliative treatment is indicated in extensive tumours with intra-cranial extension or distant metastasis.

Curative Treatment:

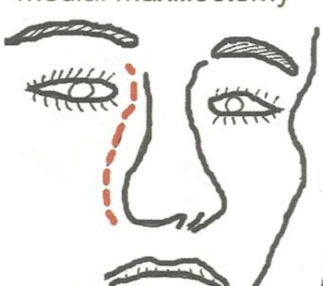
(1) For primary tumour:

A-Surgery
B -Postoperative radiotherapy.

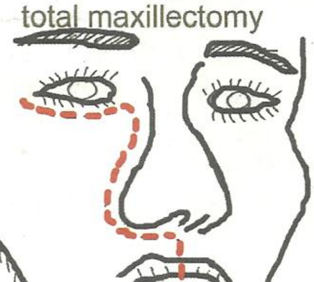
Surgery →
- Medial maxillectomy through Moure's lateral Rhinotomy (In localized tumour involving medial wall).
- Palatal resection through sub labial incision (In localized tumour involving inferior wall).
- Total maxillectomy through Weber-Ferguson incision (In large tumour involving the whole maxilla).
- Orbital exentration (If it involves the orbit or its periosteum).
- Craniofacial resection (if it reaches to the roof the nose).

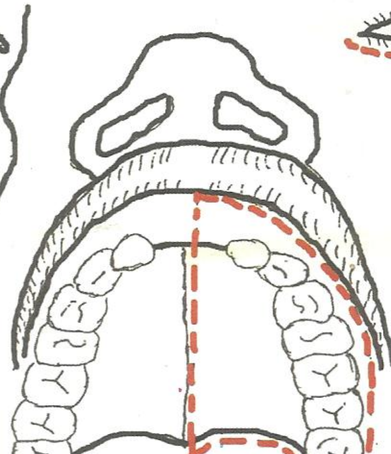
(2) For Lymph Nodes (LNs): Radical neck dissection if there is LN enlargement.

Lat. rhinotomy for medial maxillectomy



Weber Fergusson for total maxillectomy





Sublabial incision for palatal resection

Cysts of the nose and sinuses

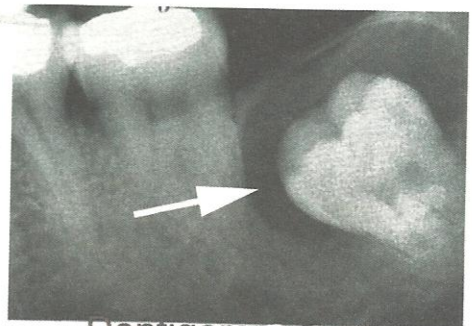
1-Dermoid cyst:

In midline at the dorsum of the nose.
Treatment by excision.

2-Odontogenic cysts:

a) Dentigerous:

- More common in Children.
- Occur around unerrupted tooth (more in the maxilla).
- X-ray or CT shows the unerrupted tooth inside the cyst.
- Treatment: excision.

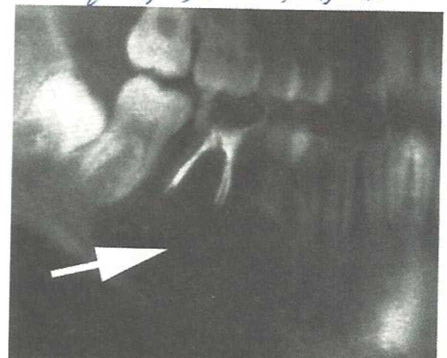


Dentigerous cyst

b) Dental:

- More common in Adults
- Occur around root of infected tooth (more in the mandible).
- X-ray or CT shows the cyst around the root of infected tooth.
- Treatment: excision and removal of infected tooth.

c) Cystic degeneration in adamantinoma.



Dental cyst

3-Developmental cysts:

a) Nasopalatine: in the midline behind incisors.
b) Naso-alveolar: in the nasolabial fold.

4-Mucocele.

Mucocele:

Def.: Cystic expansion of the sinus with mucus.

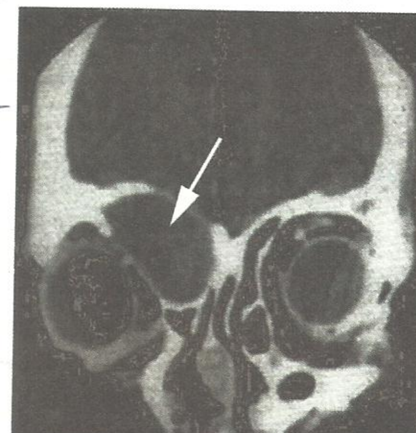
Causes: Obstruction of the sinus ostium due to:
- Traumatic: surgical or accidental.
- Neoplastic: Osteoma.
- Inflammatory: Oedema of the ostium.

Sites:
Frontal sinus +++
Ethmoid sinus ++
Fronto-ethmoid +++++
Other sinuses: very rare.

Pathogenesis: Obstruction of sinus ostium→ retention of mucus→ expansion of the sinus→ thinning out of bony wall of the sinus→ Destruction of this bony wall.

Clinical picture:

1- Swelling:
Above the medial half of the eye in frontal mucocele.
Medial to the eye in ethmoidal mucocele.
It shows egg - shell crackling sensation (due to thinning out of bony wall) then become fluctuant (due to destruction of bony wall).



Fronto-ethmoidal mucocele

2- Proptosis:
Downwards and laterally in frontal mucocele.
Laterally in ethmoidal mucocele.

N.B.: Infection→ pyocele lead to fever, throbbing pain and may rupture→ fistula.

Investigations:
- X-ray: Opacity and loss of scalloped appearance of frontal sinus.
- CT: more diagnostic.

Treatment:
Excision through external fronto ethmoidectomy or endoscopic (recent).

Symptomatology

Nasal Obstruction

	Bilateral obstruction	Unilateral obstruction
Congenital	Choanal atresia (bilat.)	Choanal atresia (unilat.)
Traumatic	Fracture nose Septal haematoma.	Fracture nose. FB in nose.
Inflammatory	Acute rhinitis (non specific) Chronic Rhinitis (specific and non-specific). Acute sinusitis. Chronic sinusitis. Septal abscess.	Acute rhinitis (sepecific) → Diphtheria Unilateral sinusitis.
Neoplastic	Malignant tumour of nose and sinuses (if extensive).	Benign and malignant tumour limited to one side.
Miscellaneous	Allergic Rhinitis. Vasomotor Rhinitis. Allergic polypi. Deviated septum (S-shaped).	Antro-choanal polyp. Deviated septum (C-shaped).
Nasopharyngeal causes	Adenoid. Tumour: Benign: Angiofibroma. Malignant: Carcinoma	Small angiofibroma or carcinoma

Nasal Discharge It may be anterior or posterior nasal discharge.

	Bilateral discharge	Unilateral discharge
Watery	Acute non-specific rhinitis: (common cold) in vasodilatation stage. Allergic Rhinitis. Vasomotor Rhinitis. Excessive lacrimation.	CSF rhinorrhoea
Water and food	Perforated palate (syphilis) Cleft palate. Paralysis of soft palate.	Oro-antral fistula.
Bloody	All causes of epistaxis (most probably general).	All causes of epistaxis (most probably local).
Mucopurulent and Purulent	Causes of bil. nasal obstruction (stasis → Infection)	Causes of unil. nasal obstruction.
Crusty	Atrophic rhinitis. All granuloma. Septal perforation.	Atrophic rhinitis (if unilateral as after turbinectomy).

Epistaxis

Def.: **Bleeding per nose.**

It may be anterior nasal or post-nasal.
Post-nasal bleeding may be swallowed, to be vomited later on and mis-diagnosed as hematemesis.



Causes

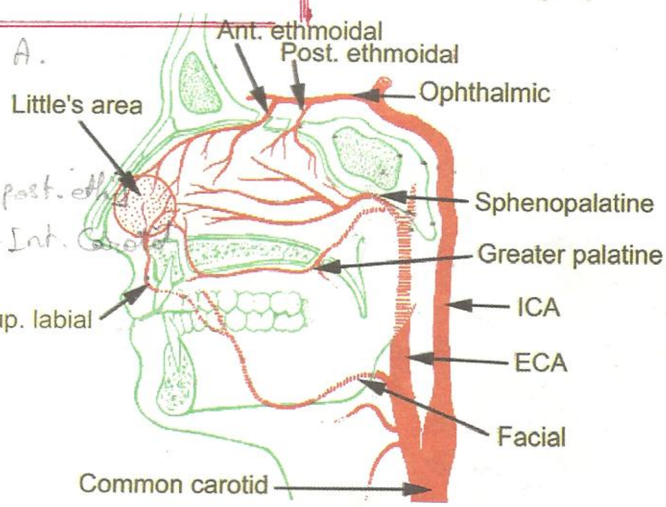
1) Local Causes:

A- Idiopathic: The commonest (90%).
- Bleeding from Little's area.
- More common in children.
- Precipitated by minor trauma or hot dry atmosphere.

N.B.: Little's area (Kiesselbach's plexus):
Anastomosis between branches of external and internal carotid arteries at the antero-inferior part of the nasal septum.
-Anterior ethmoid artery (of ophthalmic of ICA)
-Sphenopalatine artery (of maxillary of ECA)
-Greater palatine artery (of maxillary of ECA)
-Superior labial artery (of facial of ECA)

B- Traumatic:
1- Accidental:
* F.B. in nose.
* Fracture nose.
* Fracture skull base.

2- Surgical: post-operative.



C- Inflammatory:
1- Acute non-specific rhinitis
2- Acute specific rhinitis.
3- Chronic rhinitis (specific and non specific).
4- Acute and chronic sinusitis.

D- Neoplastic:
1- Nasal tumours: Benign → hemangioma and telengectasia.
Malignant → carcinoma.
2- Nasopharyngeal tumours: Benign → Angiofibroma.
Malignant → Carcinoma.

E- Miscellaneous: deviated septum lead to angulations and kinking of blood vessels.

2) General Causes:

A. Cardiovascular causes:
- ↑ Arterial blood pressure (Hypertension): it is the commonest cause in elderly.
- ↑ Venous blood pressure (sup. mediastinal syndrome): obstruction of Superior Vena Cava as by mediastinal tumour, cardiomegaly, mitral stenosis and emphysema.

B. Haematological causes:
- Defect in platelets → Thrombocytopenic purpura.
- Defect in co-agulation → Haemophilia.
- Antiplatelet drugs → Aspirin.
- Anti co-agulant drugs → Heparin.
- Leukaemia and Hodgkin's lymphoma.

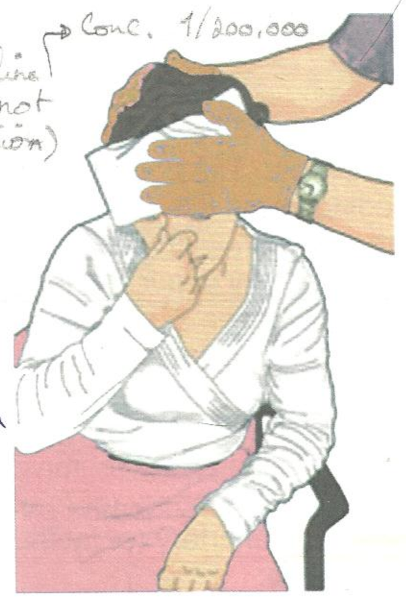
C. Hepatic Causes: Liver cirrhosis and failure → hypoprothrombinaemia.

D. Fevers: Rheumatic fever and infective endocarditis → vasculitis.

Management of Epistaxis: FACT

A) First aid:

-The patient is managed in the seated position with the head flexed forwards.
-The nose is pinched between 2 fingers.
-Application of cold compresses.
-Ask the patient to spit and not to swallow blood.
-Introduction of cotton piece soaked with vasoconstrictor into the nose for 10 minutes.



N.B.: Vasoconstrictor used is:
Adrenaline.
Or Ephedrine (in hypertensive patients).

B) Assessment:

1- History:
- Unilateral or bilateral epistaxis.
- Recurrent or not.
- History of systemic disease (Hypertension or blood disease).
- History of drug intake (as aspirin).

2- Examination:
- **Side** of bleeding: Unilateral or bilateral.
- **Site** of bleeding:

*Little's area: is the commonest site.
*Bleeding from above the middle turbinate: the source is ant. or post. ethmoidal artery.
*Bleeding from post. part below the middle turbinate: the source is sphenopalatine artery.

- **Severity of bleeding**; mild or severe (shock)
- **Shock**: detected by tachycardia (weak rapid pulse), tachypnea (rapid respiration), hypotension, cold clammy sweat, oliguria, and restlessness with irritability.

C) Control of Bleeding: According to severity

I. Mild epistaxis: controlled **by** either

a. Cauterization: done after cessation of bleeding and when the bleeding point is seen.
By either
- Chemical cautery: by Silver nitrate or Chromic acid crystals.
- Electro-cautery: under local (in adults) or general anaesthesia (in children).

b. Nasal packing: done if the bleeding dose not stop by cauterization and in active bleeding.

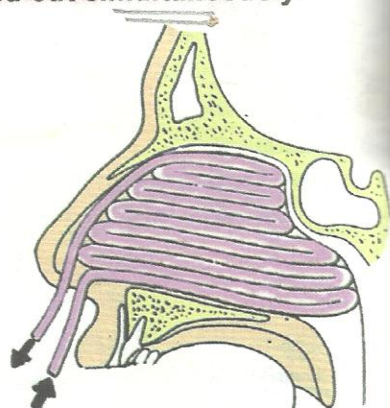
II. Severe epistaxis:

Control of bleeding and management of shock should be carried out simultaneously.

Control of bleeding by either nasal packing, surgery or embolization.

a. Nasal packing: either

1- Anterior nasal packing:
- Using ribbon gauze impregnated with Vaseline (lubricant) and Antibiotic ointment.
- Introduced in layers from below upwards.
- The pack is left for 24-48 hours.

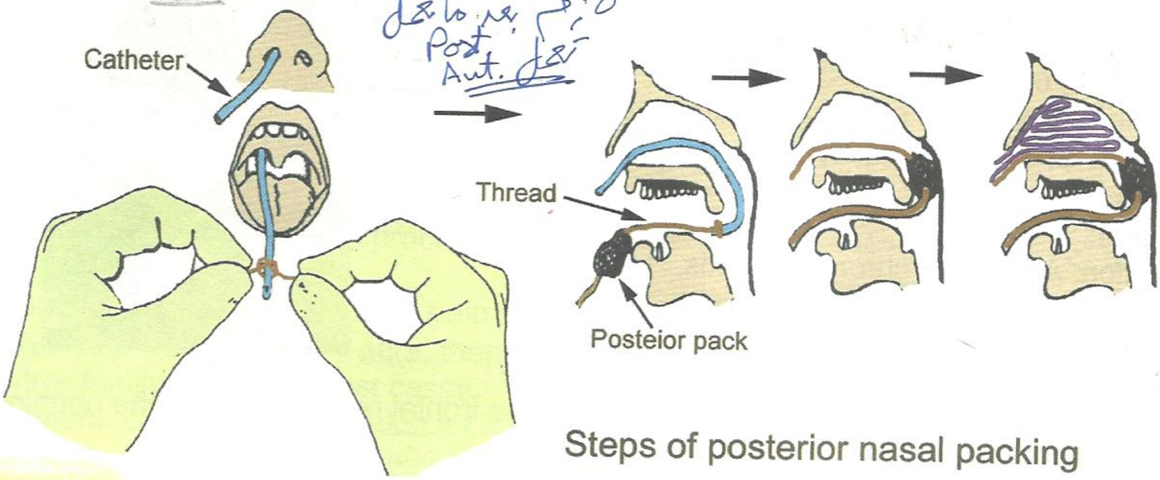


Anterior nasal packing

2- Posterior nasal packing:
- Done if the anterior packing failed to control the bleeding or in cases of posterior bleeding
- Steps: (under general anaesthesia).

* Introduce 2 rubber catheters through the nose; get them out from the mouth.

* Tie the thread of an already prepared gauze pack ($^1/_2$ inch) to its oral end and withdraw the catheters from the nose.
* Pull the thread and fix the pack in the nasopharynx.
* Do anterior nasal pack.
* Leave it for 24-48 hours.



Steps of posterior nasal packing

b. Surgery:

Is indicated if packing fail to stop bleeding:

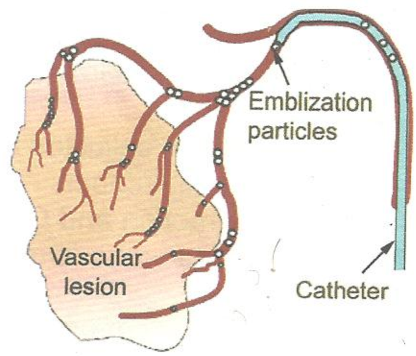
1- Maxillary artery ligation:
* If the bleeding from posterior part of nose (sphenopalatine artery).
* Removal of the anterior wall of the maxillary sinus, then removal of posterior wall, then ligates the maxillary artery in pterygo-palatine fossa.

N.B.: Ligation of ECA (ext. carotid artery) is less effective due to cross anastomosis.

2- Ethmoidal arteries ligation:
* If the bleeding from superior part of the nose (ant. and post. ethm. artery).
* Ligate the arteries through the orbital periosteum.

c. Embolization:

- Angiography to detect the bleeding vessel then injection of embolus to occlude it.



D) Treatment of the cause:

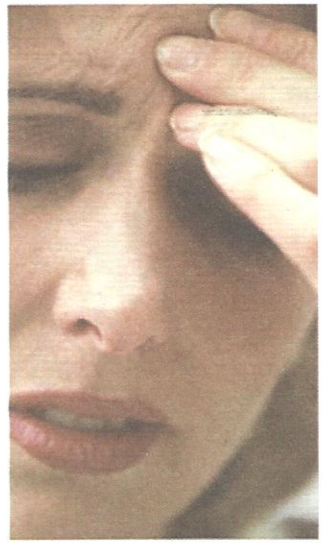
- Investigations to detect the cause:
* Co-agulation profile:
- Bleeding time.
- Clotting time.
- Prothrombin time and concentration.
- Partial thromboplastin time.
* Complete blood count (CBC).
* CT of nose and paranasal sinuses (if tumour was suspected).
* Biopsy from tumour.

- Management of the cause:
* Deviated septum → SMR or Septoplasty.
* Tumours → Surgical removal.
* Hypertension → Antihypertensives.
* Management of blood disease (Co-agulation factors and vitamin K).

N.B.: Management of Shock:

1- Complete bed rest with the head low down.
2- Sedatives; as diazepam, avoid morphia (to avoid respiratory center depression).
3- I.V. Fluids especially fresh blood transfusion in severe cases.
4- Warming of the patient.

Headache and Facial Pain



Pain sensitive structure in the head:

1- Dura of the base of the skull.
2- Cerebral arteries.
3- Venous sinuses.
4- Cranial nerves: 5th, 9th and 10th, Cervical nerves: $C_{2,3}$.

Mechanism of headache:

Traction or distension of pain sensitive structure.

Causes of headache and facial pain:

(a) Extracranial:

1- Nasal:

- Infection: Acute and chronic sinusitis.
* Its site depends on the affected sinus.
* It is more severe in the morning.
* ↑ By coughing, straining and leaning forwards.

N.B.: Vacuum headache: caused by obstruction the frontal recess which is the opening of the frontal sinus as in:
  - Frontal sinusitis.
  - Deviated septum causing obstruction of the recess.

Characterized by periodic attacks (starts in the morning, increases in the mid-day, and subsides by the end of the day) this is due to absorption of air in the sinus.

N.B.: Contact headache: caused by contact of medial wall (septum) and lateral wall (middle turbinate) in deviated septum.

- Malignant tumour of nose or sinuses.

2- Aural:

- Infection: Otitis externa, ASOM and complicated OM

N.B.: CSOM is never painful except in: complication, acute exacerbation or rarely malignant transformation.

- Tumour: Glomus, carcinoma, acoustic neuroma.

3- Ocular:

- Infection: orbital cellulites or abscess.
- Tumour: orbital tumour.
- Errors of refraction and Glucoma.

N.B.: ocular headache is more severe by the end of the day.

4- Dental:

- Infection: dental caries or peri-apical abscess.
- Trauma: post-extraction neuralgia.

N.B.: Dental caries is the commonest cause of facial pain.

5- Tempromandibular joint (TMJ):

- TMJ arthritis.
- Costen's syndrome: TMJ pain- Deafness- Tinnitus.

6- Cervical: Cervical spondylosis.

7- Neuralgias:

A. Trigeminal neuralgia:

- Paroxysmal attacks of pain along the distribution of trigeminal nerve.
- Precipitated by Stimulation of trigeminal nerve as teeth brushing.
- The cause is unknown (may be vascular loop compressing the nerve).
- Treatment:
* Medical: Carbamazepin (Tegretol)
* Surgical: by either

"اتم اللاين بقوة اللـه مروسو م"

Injection of trigeminal ganglion with Alcohol.
Trigeminal neurectomy
Decompression of the vascular loop.

B. Glossopharyngeal neuralgia:
- Paroxysmal attacks of pain along the distribution of glossopharyngeal nerve.
- Precipitated by stimulation of glossopharyngeal nerve as swallowing.
- The cause is unknown (may be long styloid process compressing the nerve).
- Treatment:
* Medical: Carbamazepin (Tegretol).
* Surgical: by either
Glossopharyngeal neurectomy.
Fracture of long styloid process.

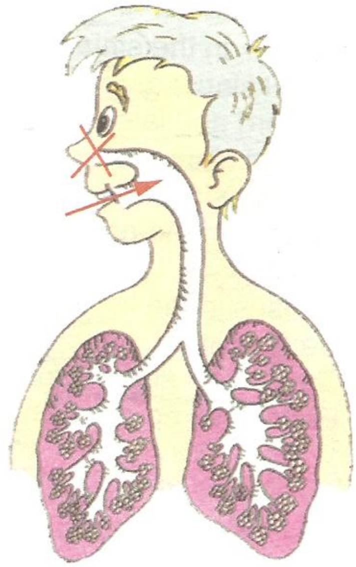
Swallowing

8 - Vascular: Migraine:
- Recurrent attacks of hemicranial pain preceded by an aura (as flashes of light).
- Mechanism: Vasospasm → aura, then vasodilatation → headache.
- Positive family history in most cases.
- Treatment: Cafergot (Ergotamine + Caffeine).

9- General:
- Systemic infections and Toxaemia.
- Constipation.
- Hypertension.

b) Intracranial:
1- Infection: Meningitis, encephalitis or brain abscess.
2- Tumour: Brain tumour.
3- Trauma: Head trauma.

Mouth breathing:

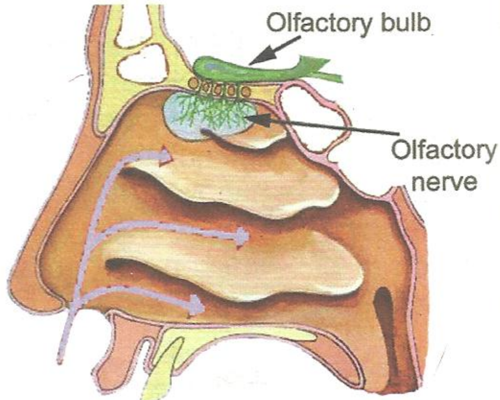


Causes:
all causes of bilateral nasal obstruction.

Effects:
1-ENT complications: the nose loses its function, leading to:
- Nasal:
a) **S**inusitis and rhinitis (atrophy of the ciliary mucosa → infection)
b) **S**uckling difficulty in infants.
c) **S**peech difficulty (nasal tone of voice i.e. rhinolalia clausa).
d) **S**noring and sleep apnea.
e) **S**mell disorders
- Oral and pharyngeal:
dry mouth → infections of teeth; pharynx and tonsils.
- Laryngeal and pulmonary:
a) Infections: as laryngitis, bronchitis.
b) Pigeon chest.
- Facial: Adenoid facies (see throat).
2-General complications: caused by hypoxia and ↑ CO_2 lead to sleep apnea syndrome with its complications (see throat).

WhiteKnightLove

Disorders



To smell, 3 factors should be present
1- odoriferous material.
2- Healthy moist olfactory mucosa.
3- Healthy olfactory filaments and their central connection.

1) Anosmia: Loss of smell.
2) Hyposmia: Diminution of smell.
Causes:
1. Intra-nasal:
- All causes of nasal obstruction (e.g. Allergic polypi).
- Atrophy of olfactory mucosa (Atrophic Rhinitis).
- Peripheral neuritis (of olfactory nerve) as after influenza or diabetes.

2. Cranial: Fracture base of skull involving cribriform plate.
3. Intracranial: Brain tumour compresses the olfactory pathway.

3) Cacosmia: Sensation of bad smell
Causes:
1- FB in the nose.
2- Sinusitis of dental origin.

4) Parosmia: Perverted sense of smell.
Causes:
Hysteria or epilepsy.

Proptosis



Def.: Protrusion of eyeball.
Causes:
1- Causes in the sinuses
- Frontal sinus: as mucocele or tumour lead to downward and lateral proptosis.
- Ethmoid sinus: as mucocele, or tumour lead to lateral proptosis.
- Maxillary sinus: as tumour lead to upward proptosis.

2- Causes in the orbit: as orbital haematoma, cellulites, abscess or tumour lead to forward proptosis.
3- Causes in the lacrimal gland: lead to downward and medial proptosis.
4- Causes in the nasopharynx: as nasopharyngeal angiofibroma or carcinoma.
5- Cavernous sinus thrombosis: lead to pulsating thrombosis.
6- Endocrinal causes: Thyrotoxicosis.

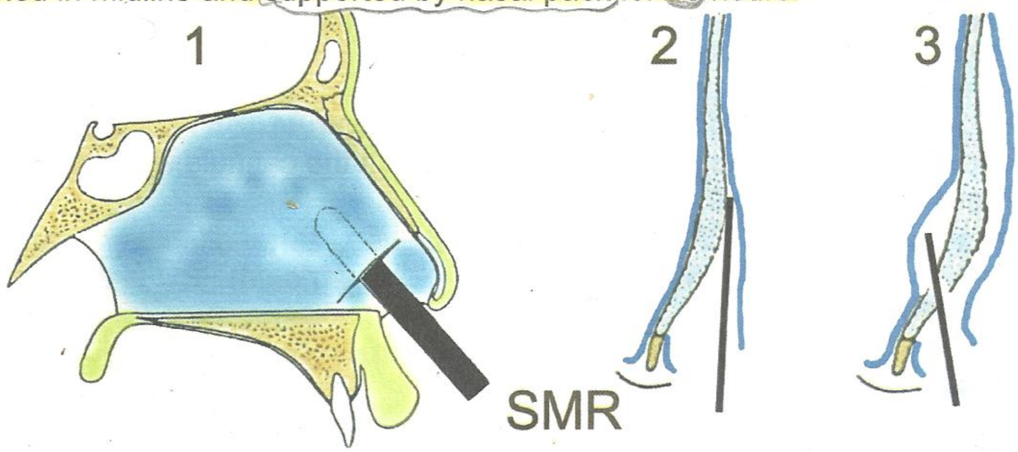
"كثيرة هي بلايا الصديق ومن جميعها ينجيه الرب"

Operations

1 Submucous resection of the septum (SMR)

not before 18

Def.: **Removal** of the deviated portion of the septal cartilage ± bone.
Indications: Symptomatizing deviated septum.
Contraindications: before the age of 18 years as removal of cartilage will interfere with the development of the face.
Technique:
-Anaesthesia: General or local.
-Incision: Vertical in the muco-perichondrium in one side, behind anterior end of septum.
-Then elevate the mucoperichondrial flap in this side., an incision is deepened in the cartilage more posterior to the previous incision, the mucoperichordrial flap is elevated in the other side.
-The deviated cartilage ± bone is removed, and then mucoperichondrial flaps are repositioned in midline and supported by nasal pack for 48 hours.

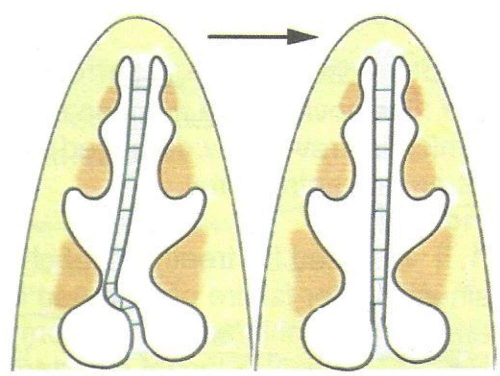


SMR

2 Septoplasty

at any age

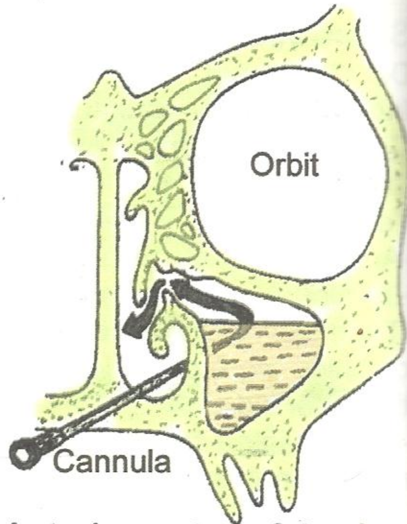
Def.: **Straightening** of the spetal cartilage without (or with minimal) removal.
Indications:
1-Symptomatizing deviated septum at any age.
2-Septal dislocation.
Technique:
-Anaesthesia: General or local.
-Incision: at the anterior end of the septum with elevation of mucoperichondial flaps and straightening of deviated portion.



Septoplasty

Complications of SMR and Septoplasty: (APCD)
1. Anesthetic complications.
2. Post-operative haemorrhage, haematoma, infection (septal abscess and sinusitis), and adhesions between septum and turbinate (it is the commonest complication).
3. Perforation of the septum (more in SMR, less in Septoplasty).
4. CSF Rhinorrhoea (Trauma to cribriform plate).
5. Deformity: Supratip depression (in SMR and not in septoplasty).

3 Antral Puncture and Lavage



Antral puncture & lavage

Indications:

1-Diagnostic:

a) To know the contents of the sinus, i.e. if pus → irreversible mucosal damage.
b) Culture and sensitivity of discharge.
c) To inject lipiodol (contrast material) in fistulography to diagnose oro-antral fistula.

2-Therapeutic: It was used in the past for the treatment of chronic sinusitis.

Contraindications:

1. Fracture maxilla (spread of infection).
2. Children and hypoplastic maxillary sinus (orbital injury).

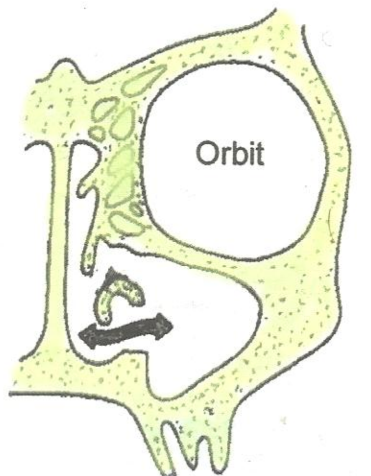
Technique:

-Anaesthesia: Local
-Trocar and cannula are introduced below the inferior turbinate, one inch behind its anterior end, directed towards the outer canthus, and then penetrate into the antrum.
-The trocar is removed and the sinus is washed through the cannula with warm saline.

Complications:

1. Injury to { Cheek if directed anterior; Orbit if directed superior.
2. Mild Haemorrhage.

4 Inferior Intranasal Antrostomy



Inf. intranasal antrostomy

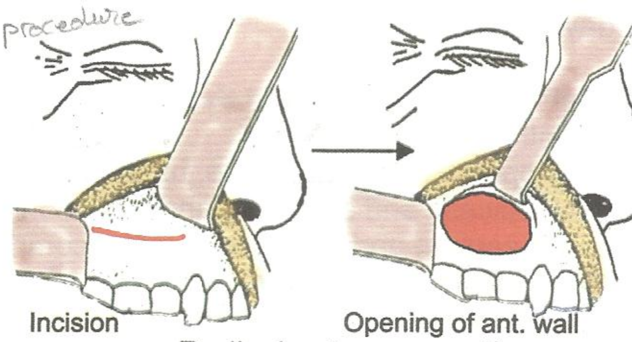
Def.: Making opening below inferior turbinate.
Indication: It was used in chronic sinusitis after failure of repeated puncture.
Disadvantage: It is obsolete nowadays as it is against the direction of ciliary movement.

5 Radical antrum operation (Caldwell-Luc)

Def.: Removal of the mucosa of the maxillary antrum (which is irreversibly damaged) and making inferior intranasal antrostomy.

Indications:

1. It was used for treatment of chronic sinusitis after failure of repeated puncture and intra-nasal inferior antrostomy.
N.B.: FESS is the recent standard surgical treatment for chronic sinusitis.
2. Recurrent antro-choanal polyp.
3. Oro-antral fistula.
4. Dental and Dentigerous cyst.
5. Benign Tumour.
6. Ligation of maxillary artery in epistaxis.
7. Removal of F.B. (as retained dental root).



Radical antrum operation

Technique:

- Anaesthesia: General
- Incision: Sub labial

-The periosteum of anterior wall of the sinus is elevated.
-An opening is made in the anterior wall of the sinus.
-The mucosa is removed by curette.
-Inferior intra-nasal antrostomy is performed.
-The sinus is packed with Vaseline gauze impregnated with antibiotic, to be removed after 48 hours.

Complications:

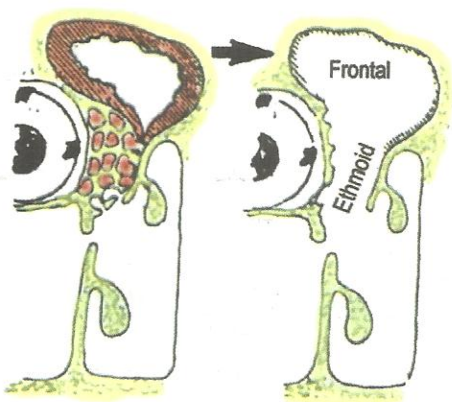
1- Injury to infra-orbital nerve leading to numbness and loss of cheek sensation.
2- Post-operative oedema of the cheek.
3- Recurrence of the disease.

6 External Fronto Ethmoidectomy

Def.: Opening of the frontal sinus and removal of ethmoidal air cells.

Indications:

1. Chronic Frontal and/or ethmoidal sinusitis, not used nowadays being replaced by FESS.
2. Complicated ethmoidal sinusitis.
3. Recurrent extensive Allergic Polypi.
4. Mucocele
5. Osteoma.
6. Ligation of ethmoidal arteries in epistaxis.
7. Repair of dura in CSF rhinorrhoea.



Fronto-ethmoidectomy

Technique:

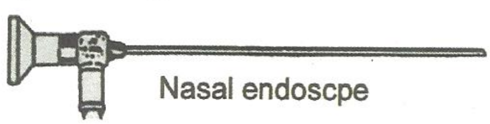
-Anaesthesia: General.
-Incision: Medial to inner canthus.
-The periosteum and lacrimal sac are elevated.
-The medial orbital wall is penetrated.
-The ethmoidal cells are exenterated.
-The floor of the frontal sinus is opened.
-Drainage tube is inserted to be removed 6 weeks - 6 months later.

7 Nasal Endoscopy

Def.: Direct visualization of nose and sinuses by the use of endoscopes.

Types of Endoscope: Rigid and has special angle and diameter

Angle: 0°, 30° or 70°
Diameter: 2.7mm or 4mm


Nasal endoscpe

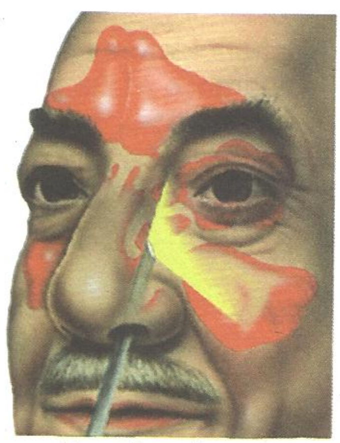
Indications:

A) Diagnostic endoscopy:

-The best endoscope is 0° (angle) with 2.7mm in diameter.
-The nose should be sprayed with Xylocaine (local anesthetic) and packed with adrenaline (vasoconstrictor).

Indications: to diagnose

1- Chronic sinusitis.
2- Nasal obstruction (chronic).
3- Epistaxis (to detect source of bleeding).
4- CSF Rhinorrhoea (to detect site of leakage).
5- FB in hidden area.
6- Biopsy from nasal or nasopharyngeal tumours.
7- Unilateral secretory otitis media in adults to detect nasopharyngeal tumour.

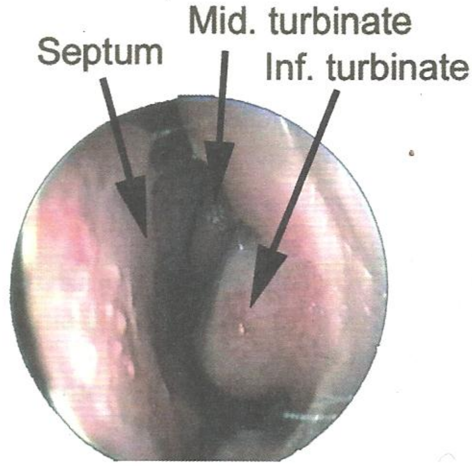

Nasal endoscopy

8- Follow-up after nasal operations to detect adhesion.

B) Endoscopic Sinus Surgery (Therapeutic):

Indications: ABCDEF + sinusitis.

1. Chronic or Recurrent acute sinusitis (the operation is called FESS).
2. Allergic polypi (A).
3. Antro-choanal polyp. (A)
4. Benign tumour of nose and sinuses (B)
5. Blow out fracture of orbit (B).
6. Choanal atresia (C).
7. C.S.F. Rhinorrhoea (C).
8. DCR (D).
9. Decompression of orbit and optic nerve (D).
10. Epistaxis (E).
11. Fronto-ethmoidal mucocele (F).
12. Septal and Turbinate surgery.



Contraindications: Malignant tumours.

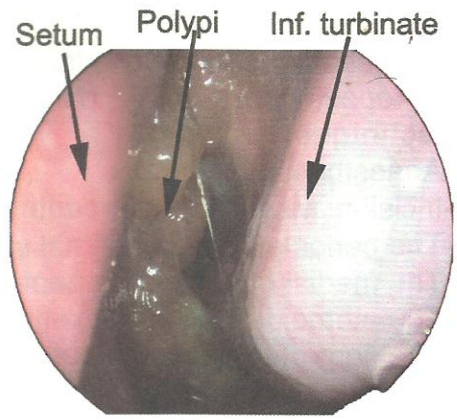
Complications:

1. Major: ABCD

A) **Anesthetic** complications as anaphylactic shock, succinyle apnea and cardiac arrest.
B) **Brain** injury: CSF Rhinorrhoea and meningitis.
C) **Carotid** injury: fatal Haemorrhage.
D) **Diplopia** and loss of vision (optic injury).

2. Minor: AASEE

- Anosmia
- Adhesions (intranasal).
- Sinusitis (recurrence).
- Epistaxis.
- Ecchymosis (orbital)



Functional Endoscopic Sinus Surgery (FESS)

Def: Intra-nasal endoscopic procedure, in which the diseased mucosa is removed (eradicated) while the healthy mucosa is preserved with restoration of normal drainage of sinuses (so it is called functional).

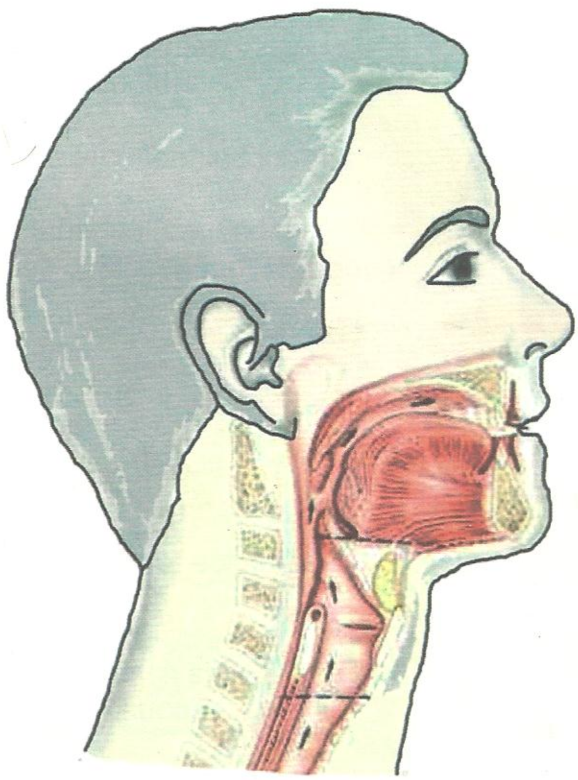
The technique consists of:

1-Correction of anatomical abnormality (deviated septum…)
2-Anterior ethmoidectomy.
3-Middle meatal antrostomy (widening of maxillary ostium).
4-Posterior ethmoidectomy: if needed
5-Sphenoidotomy if needed.
6-Clearance of the frontal recess: if needed.

Advantages:

1- Eradication of the disease.
2- Restoration of normal physiology (i.e. Functional).

Throat



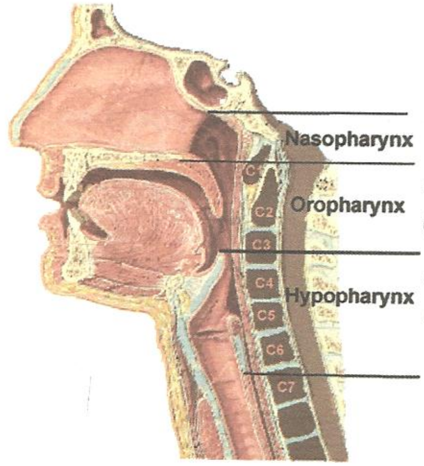
"سيكون لكم في العالم ضيق" + "لكن ثقوا انا قد غلبت العالم"

Pharynx

Anatomy

- It is a fibromuscular tube extends from the skull base to 6th cervical vertebra.
- It lies behind and devided into:

Nose → nasopharynx (C_1)
Mouth → Oropharynx (C_2 - C_3)
Larynx → Hypopharynx (C_4 - C_6)



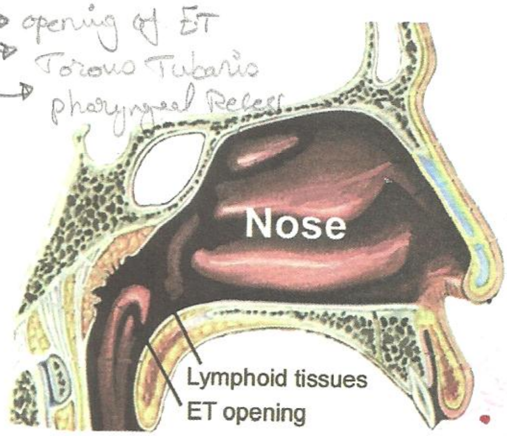
Skull Base → palate

The nasopharynx:

- Extends from skull base to the palate.
- Behind the nose (choana). → Naso-pharynx
- Features:

Roof:
contain sub-epithelial lymphoid tissues
(when hypertrophied called Adenoid)
Lateral wall:
.Opening of Eustachian tube (1cm behind inferior turbinate).
.Tubal elevation or torous tubarius (caused by ET)
.Pharyngeal recess or fossa of Rosen muller (above and behind ET opening). → Site of naso pharyngeal Carcinoma (silent area)

Lat. → opening of ET, Torous Tubaris, pharyngeal Recess

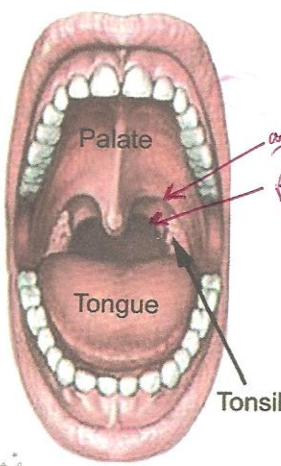


Palate → tip of Epiglottis

The oropharynx:

- Extends from the palate to the tip of epiglottis.
- Behind the oral cavity. → oro-pharynx
- Features:

The palatine tonsils present on each side of oropharynx between pillar of fauces. → pharynx in latin ☺



ant. / post. Pillar

Epiglottis → lower border of cricoid cartilage

The Hypopharynx:

- Extends from tip of epiglottis to the lower border of cricoid cartilage.
- Behind the larynx.

Consists of 3 parts (Imp)

Pyriform Fossa:

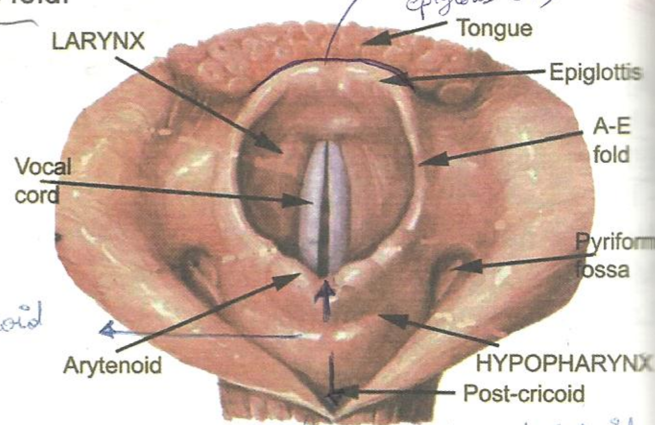
-Laterally: Thyroid cartilage and thyrohyoid membrane.

-Medially: Cricoid cartilage and aryepiglottic fold.

Postcricoid area:

Extends from the Arytenoid cartilage above to the lower border of cricoid cartilage below.

Posterior pharyngeal wall



Pharyngeal wall is formed of:

1- Mucosal layer: Stratified sq. epith. except the nasopharynx (respiratory epithelium).
2- Subepithelial connective tissue.
3- Muscular layer:
Main pharyngeal muscles: sup., Mid., and inf. constrictors.
Accessory pharyngeal muscles: stylo-, salpingo-, and palato- pharyngeus muscles.
4- Buccopharyngeal fascia: Covers the pharynx from outside, seperated from prevertebral fascia by retropharyngeal space (both are connected in mid-line by median raphe).

Blood Supply:

1. **A**scending pharyngeal artery from ECA.
2. **A**scending palatine artery from facial artery.
3. **D**escending palatine artery from maxillary artey.
4. **D**orsalis lingual artery from lingal artery.
5. **T**onsillar artery from facial artery.

Venous drainage:

Pharyngeal plexus → IJV (jugular vein).

Nerve Supply:

- Motor: all pharyngeal muscles are supplied from pharyngeal plexus (from vagus) except 2 muscles:
Tensor palati: by trigeminal nerve.
Stylopharyngeus: by glossopharyngeal nerve.
- Sensory: from pharyngeal plexus (from glossopharyngeal) except the hypopharynx from glossopharyngeal and vagus.

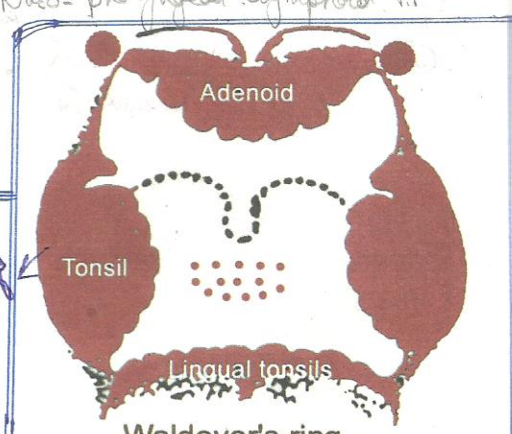
N.B.: Pharyngeal plexus of nerves:
-Motor (vagus)
-Sensory (Glossopharyngeal).

Lymphatic drainage:

Retropharyngeal LNs (lymph nodes) to the deep cervical LNs.

Waldeyer's ring:

-It is a ring of lymphoid tissues present in the subepithelial connective tissues in the upper part of aerodigestive tract.
-It has no afferent lymphatic vessels and has only efferent lymphatics (i.e. direct contact with the organism).



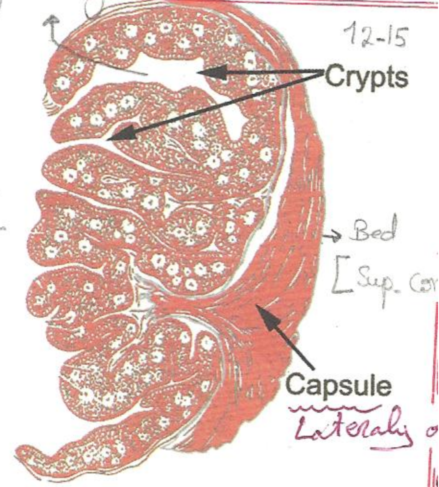
Waldeyer's ring

"اليوم ان سمعتم صوته فلا تقسوا قلوبكم" Waldeyer's ring

-It is drained in retropharyngeal LNs then to the upper deep cervical LNs.
-It consists of:
1- Nasopharyngeal lymphoid tissue. → Hypertrophic → adenoid
2- Tubal tonsil (around the ET).
3- Palatine tonsils (in the oropharynx).
4- Lingual tonsils (at the base of the tongue).
5- Lymphoid follicles in the posterior pharyngeal wall.

Anatomy of the tonsils:

. Two almond shaped masses of lymphoid tissues present on each side of oropharynx between anterior and posterior pillars (in the tonsilar fossa).
. Descreption of the tonsil:
Upper pole → reaches to the soft palate.
Lower pole → reaches to the tongue.
Lateral surface → covered by capsule separate it from its bed (superior constrictor).
Medial surface → covered by stratified sq. epith. of oropharynx, showing 12-15 invaginations called crypts, the largest one (Upper one) is called crypta magna.
. Blood supply → The same as the pharynx.
. Venous drainage → paratonsillar vien to pharyngeal plexus to I.J.V.
. Lymphatic drainage → to Jugulodiagastric LNs (part of upper deep cervical LNs).
. Functions: protective functions, It plays role in humoral and cell-mediated immunity in the childhood period. after childhood → Atrophy



Physiology: i.e. Functions of the pharynx

1. Respiratory channel.
2. Food channel (Deglutition). } Common Route for both air & food (Trachea, Oesophagus)
3. Articulation of speech.
4. Resonance of voice.

Deglutition: Consists of 3 stages.

1st stage:	Oral	→ Voluntary.
2nd stage:	Pharyngeal	→ Involuntary.
3rd stage:	Oesophageal	→ Involuntary.

Inflammations of the Pharynx

A. Acute:

- Non specific pharyngitis
- Specific pharyngitis: 1. Diphtheria. 2. Vincent's angina. 3. Moniliasis. (Coryne bact. diphtheria) (Borrelia vincenti) Candida albicans (fungus)
- Blood diseases:
  1. Agranulocytosis.
  2. Leukaemia.
  3. Infectious mononucleosis.

B. Chronic:

- Non specific pharyngitis.
- Specific pharyngitis: 1. Scleroma. 2. T.B. 3. Syphilis.

C. Inflammations of lymphoid tissues:

1. Adenoid.
2. Tonsillitis.

Inflammation of Lymphoid tissue +

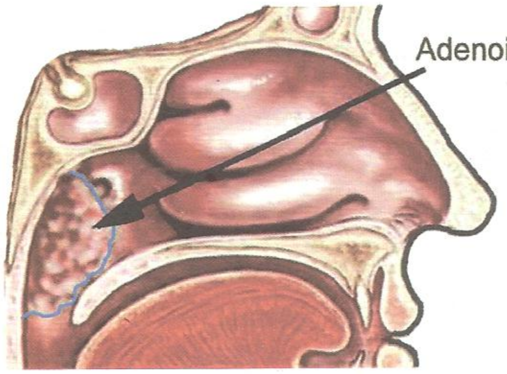
I Adenoid

Def.: Hypertrophy of lymphoid tissue of the nasopharynx sufficient to produce symptoms.

N.B.: It is the commonest nasopharyngeal swelling.

Age: Childhood period

Cause: Repeated upper respiratory tract infection.



Clinical picture:

Symptoms:

*CHL *Rhinolalia Clausa

1- Effects of hypertrophy:

A) Bilateral nasal obstruction:
- **S**noring and sleep apnea.
- Difficult **s**uckling in infants.
- Rhinolalia clausa (nasal tone of voice, abnormal **s**peech). → in closed nose / cleft palate
- Anterior nasal discharge (Bilateral)

B) Eustachian tube obstruction: CHL (conductive hearing loss) due to either: recurrent AOM or secretory OM.

C) Adenoid facies:
- Open dry mouth.
- Elevated upper lip.
- Promient central incisors.
- High arched palate.
- Receding lower Jaw. (retroplatia)
- Narrow pinched anterior nares.
- Apathetic look. = idiot Look



Adenoid facies

2- Effects of Recurrent infection:

A) Rhinitis and sinusitis.
B) Otitis media.
C) Pharyngitis, laryngitis and bronchitis.

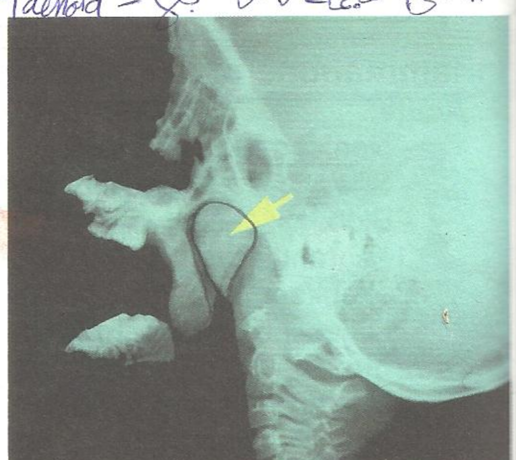
3- General Effects:

A) **S**chool retardation (due to deafness + interrupted sleep).
B) Nocturnal enure**s**is. ← Mech.
C) **S**leep apnea.

Signs:

1- Adenoid facies (Mentioned above).
2- Anterior Rhinoscopy: narow pinched anterior nares + discharge.
3- Posterior rhinoscopy: postnasal discharge + adenoid may be seen.
N.B. The difference between adenoid and tumour is the adenoid has furrows. 2012
4- Oral cavity: Open dry mouth.
5- Digital palpation: The adenoid may be felt.
6- Nasal endoscopy diagnostic

Adenoid =



...wing adenoid with narrow nasopharyngeal air column

Investigations:

Plain X-ray (soft tissue lateral view on nasopharynx) show narrowing of air column.

Treatment:

Adenoidectomy (± tonsillectomy if indicated)

WhiteKnightLove

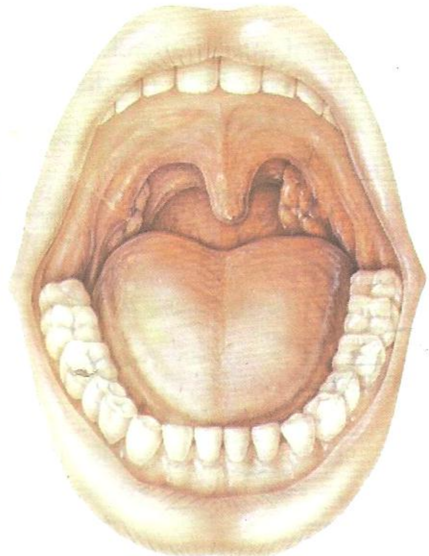
"رب الجنود معنا ملجأنا اله يعقوب"

2 Acute Tonsillitis

Def.: Acute inflammation of lymphoid tonsillar tissues.

Causes:

- Low general resistance.
- Upper respiratory tract infection



Causative organism: May starts by viral infection then secondary bacterial infection.

The commonest organism is Beta-hemolytic streptococci.

Pathology:

1- Acute catarrhal tonsillitis: Oedema and congestion of mucosa of tonsils

2- Acute follicular tonsillitis: Pus within the crypts appear as yellowish spots on the surface.

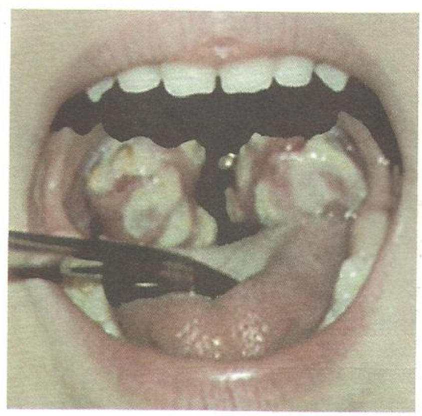
3- Acute parenchymatous tonsillitis: Hugely enlarged tonsils.

Clinical picture:

Symptoms:

General: Fever, headache, malaise and anorexia.

Local: Dysphagia, sore throat (± referred otalgia)
Hot potato voice.
Foetor oris.



Signs:

General : ↑temp. and ↑pulse.

Local:

- Tonsils show

.Congestion and oedema in catarrhal tonsilitis

.Yellowish spots in follicular tonsillitis

.Hugely enlargement in parenchymatous tonsilitis

- LNs: Enlarged, firm and tender (Jugulodiagastric LNs).

Investigations: in resistant cases MCQ

1- Throat swab for culture and sensitivity.

2- C.B.C. → leucocytosis → Leukemia

3- ↑ESR.

Complications:

General:

-Rheumatic fever

-Glomerulonephritis

Local:

-Phyaryngeal suppurations as Quinsy (Abscess around the palatine Tonsils) / Parapharyngeal abscess / and Retropharyngeal abscess.

-Extension of infections as OM (otitis media) / Laryngitis / Bronchitis.

-Chronicity.

Treatment:

General:

Complete bed rest + warm fluids.

Systemic antibiotics

Analgesic antipyretics.

Local:

Antiseptic mouth gargle.

Medical for Acute

Chronic Tonsillitis

Def.: Chronic inflammation of lymphoid tissues of tonsils.

Cause:

- Recurrent acute attacks.
- Persistence of the predisposing factors.

Clinical picture:

Symptoms:

General: manifestations of septic focus.

Local:

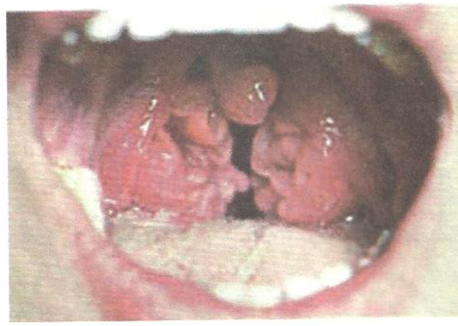
- Recurrent acute attacks i.e. Dysphagia and sore throat.
- Otalgia (through Jackbson's nerve of glossopharyngeal).
- Foetor oris.
- Enlarged tonsils lead to:
    - a- Dysphagia.
    - b- Snoring and sleep apnea.
    - c- Hot potato voice.

Signs:

Tonsils show

- Congested anterior pillars.
- Size: Asymetrical enlargement.
- Shape: Irrigular.
- Squeezing: → Oozing pus.
- Probing → Indurated (firm).

Lymph nodes: enlarged and firm.



Investigations:

1- ↑ E.S.R.

2- ↑ A.S.O. titre (Normal =up to 200 tod's units)

Treatment:

Tonsillectomy

Septic Focus

Def.: Chronic bacteraemia or toxaemia caused by chronic inflammations.

Examples:

- Chronic tonsillitis.
- Chronic sinusitis.
- Chronic cholecystitis.
- Chronic salpingitis.

Clinical picture:

1- **Kidney**: glomerulonephritis.

2- **Low** grade fever.

3- **Anaemia**.

4- **Myalgia** and arthralgia.

5- **Heart**: Rheumatic fever.

6- **Lung**: Bronchiectasis.

7- **Skin**: Dermatitis.

8- **Eye**: Iridocyclitis.

Diphtheria

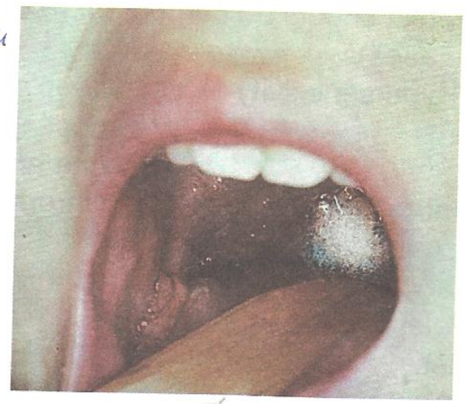
Causative organism: Corynebacterium diphtheria.
Mode of transmission: Droplet infection.
Age: 2-5 years
Incubation period: 2-5 days.
Types:
1- Pharyngeal (faucial) diphtheria: The commonest.
2- Laryngeal: 2ry to faucial diphtheria.
3- Nasal: 2ry to faucial diphtheria.

Pathology: The organism remains in the pharynx producing powerful Exotoxins which has:
- -Local effects: necrosis of tissues and pseudomembrane formation.
- -Systemic effects: fixation to cardiac and neural tissues.

Clinical picture:

Symptoms:
General: Low grade fever, headache, malaise and anorexia.
Local: Severe dysphagia and sore throat.

Signs:
General:
↑temp. (not more than 38°).
↑Pulse (disproprtionate to fever)
Toxaemia (Pallor).



Local:
Pharynx shows psudomembrane which is:
- Unilateral.
- Exceeds the limit of tonsil.
- Dirty greyish in colour.
- Offensive in odour.
- Deeply adherent.
- If removed → raw bleeding surface.
- It will reform rapidly.

Cervical LNs: Hugely enlarged (Bull's neck).

Investigations: Throat swab for:
- Direct smear: G +ve bacilli (chinese letter appearance).
- Culture on Loffler's serum or Tellurite medium.

Differntial diagnosis: From all diseases causing membranes on the pharynx
1- Acute follicular tonsillitis:

	Acute follicular tonsillitis	Diphtheria
Onset	Acute	Insidious
Temperature	May be high	Low grade fever
Pulse	Proportionate to fever	Disproportionate to fever
Face	Flushed	Toxic (pale)
Toxaemia	No or mild	Severe
Pseudom-embrane	Bil., Yellowish, limited to tonsils, and loose	Mentioned above
Throat swab	Beta-Hemolytic Streptococci	Corynebactrium diphtheriae

2- Vincent's angina
3- Moniliasis:
4- Blood diseases: Infectious mononucleosis, Agranulocytosis and Leukaemia

Complications:
1- Cardiovascular: Heart failure; may be early due to toxic myocarditis.
Or late due to vagal neuritis.

Complic.

2- Neurological:
a) Palatal paralysis (the 1st) → nasal regurgitation.
b) Ocular paralysis → Intrensic (loss of accomodation).
→ Extrensic (Diplopia and squint).
c) Laryngeal paralysis → Laryngeal obst. (stridor).
d) Pharyngeal and oesophageal paralysis → Dysphagia.
e) Respiratory paralysis → Respiratory failure.

3- Respiratory:
a) Laryngeal obstruction by the pseudomembrane.
b) Respiratory infection: Bronchopneumonia, abscess.
c) Respiratory failure due to respiratory paralysis.

4- Renal: Glomerulonephritis → Albuminuria.

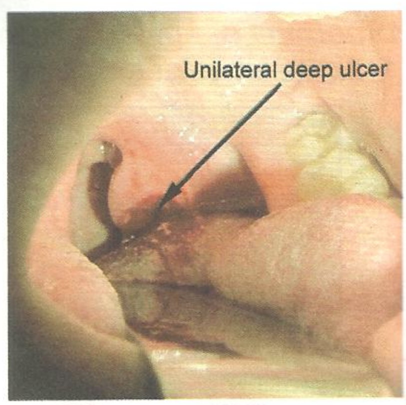
Treatment:

1- Hospitalization and isolation. *→ droplet inf.*
2- Antitoxic serum:
. Dose: 40.000-100.000 IU, IM or IV (double this dose in severe cases).
. Given once the diagnosis was suspected.
. Pre-test should be carried out (0.05 ml injected intradermal → erythematous wheel in +ve cases)
. In Hypersensitivity → use sheep's serum (not hoarse serum).
→ or Hyposensitization.
→ cortisone and antihistaminics.
3- Antibiotics: Penicillin or erythromycin.
4- Treatment of complications:
a) Laryngeal paralysis → Tracheostomy.
b) Palatal, pharyngeal and oesophageal paralysis → Nasogastric tube.
c) Respiratory paralysis → Artificial respiration.

Prophylaxis:

1-Active Immunization: DPT (compulsory), given at 2, 4, 6 months, then booster dose at 18 months, 2nd booster dose at school age.
2-Passive Immunization: Small dose of antitoxic serum (for contactants).

Vincent's Angina (Trench mouth)



Causative organism: Borrelia vincenti and Fusiform bacilli.
Predisposing factor: bad oral hygiene.
Clinical picture:
Symptoms:
General: Fever, headache, malaise and anorexia.
Local: Dysphagia and sore throat.
Signs:
General: ↑ temp. + ↑ pulse.
Local:
-Pharynx shows pharyngeal ulceration *(→ acute Bact.)* with pseudomembrane (unilateral, deep irregular).
-LNs: submandibular LNs → enlarged, firm and tender.
Investigations: Swab for direct smear and culture.
Treatment:
General: -Complete bed rest + plenty of warm fluids.
-Systemic antibiotics.
-Analgesic antipyretic.
Local: -Antiseptic mouth wash.

Moniliasis

Causative organism: Candida albicans (Fungus).

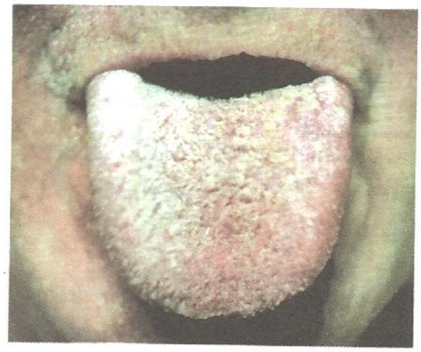
Predisposing factors:

- Prolonged antibiotic therapy (super-infection).
- ↓ Immunity: Diabetes, AIDS, chronic diseases.

Clinical picture: no fever

Symptoms: Dysphagia and sore throat.

Signs: Milky whitish pseudomembrane.



Treatment:

- Stop the antibiotic therapy.
- Antifungal: Nystatin

Blood Diseases

Infectious mononucleosis (Glandular fever)

Causative organism: Epstein Barr Virus.

Clinical picture:

- Febrile manifestations: Fever, headache and malaise.
- Anginose manifestations:

Dysphagia and sore throat.

Oropharyngeal ulcerations, with pseudomembrane

- Glandular manifestations: Generalized lymphadenopathy ± hepatosplenomegaly.

In addition:

1- Palatal petichiae.

2- Skin rash (if ampicillin is taken).

Investigations:

- CBC → Monocytosis.
- Serological tests: Paul-Bunnel test or monospot test.

Treatment:

1- Complete bed rest, plenty of warm fluids.

2- Antibiotics but avoid ampicillin.

3- Analgesic antipyretics.

4- Cortisone: if there is airway obstruction.

5- Antiseptic Mouth wash.



Infectious mononucleosis with bil. cervical lymphadenopathy

Agranulocytosis:

Def.: Bone Marrow depression → ↓ granulocytes (neutrophils) i.e. leukopenia.

Cause:

May be Idiopathic, or due to antibiotic as chloramphenicol, Cytotoxic drugs or Irradiation

Clinical Picture:

General: Recurrent infections.

Local:

- Dysphagia and sore throat.
- Oropharyngeal ulcerations with pseudomembrane, surrounded by little inflammatory reaction (leukopenia).

Investigations:

- CBC: → Leukopenia.
- Sternal puncture.

Treatment:

1- Stop the causative drug.

2- Hospitalization, isolation, antibiotics to prevent any infection.
3- Fresh blood transfusion.
4- Bone Marrow transplantation may be needed.

Leukaemia:

Def.: Neoplastic proliferation of leukocytic precursors in bone marrow → Leucocytosis (Blast cells) + Thrombocytopenia (↓ platelets) + Anaemia (↓ RBCs)

Clinical picture:

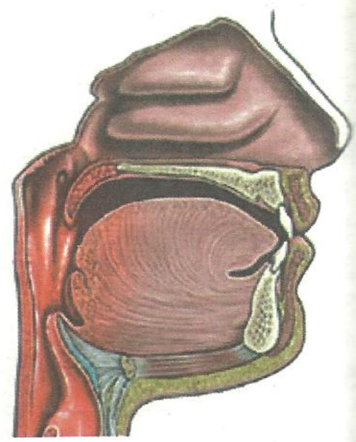
General:
- Recurrent infections (Blast cells)
- Bleeding tendency (↓ Platelets)
- Pallor (↓ RBCS).
-Generalized lymphadenopathy ± hepatosplenomegaly.

Local:
- Dysphagia and sore throat.
- Oropharyngeal ulcerations with pseudomembrane.

Investigations:
- CBC → Leukocytosis + Anaemia + Thrombocytopenia.
- Sternal puncture.

Treatment:
1- Hospitalization, isolation and antibiotics to prevent any infection.
2- Fresh blood transfusion.
3- Chemotherapy: Leukeran (cytotoxic drug).

Acute non specific pharyngitis



Causative organism:
Usually starts by viral then secondary bacterial infection.

Clinical picture:
As acute tonsillitis but the infection and congestion are not limited to the tonsils (diffuse).

Treatment: as acute tonsillitis.

Chronic non specific pharyngitis

Cause:
- Repeated acute attacks.
- Persistence of the predisposing factors.

Clinical picture:

Symptoms:
- Recurrent acute attack.
- Sense of Dryness.

Signs:
Congested oedematous mucosa, may be hypertrophied or atrophied.

Treatment:
- Treatment of predisposing factors.
- Antibiotics.
- Antiseptic mouth gargle.

Chronic Specific Pharyngitis

- Pharyngoscleroma: Usually associated with Rhinoscleroma.

Stages
- -Atrophic: → Atrophy of mucosa.
- -Hypertrophic (nodular): → submucosal nodules.
- -Fibrotic: → submucosal fibrosis

- T.B.:
- - Associated with pulmonary T.B.
- - T.B. ulcers with undermined edge, surrounded by pallor.

- Syphilis:
- 1ry → chancre.
- 2ry →mucous patches and snail track ulcers.
- 3ry → Gumma which ulcerates (punched out edge).

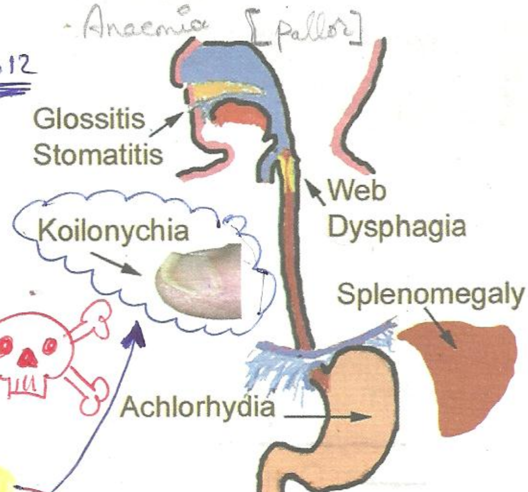
N.B.: It may cause perforation of hard palate.

ENT manifestations of AIDS

1- Aerodigestive moniliasis.
2- Kaposi's sarcoma.
3. Hairy leukoplakia.
4. Cervical lymphadenopathy.
5. Recurrent extensive infections.



Plummer - Vinson's Syndrome (Paterson – Brown Kelly disease)

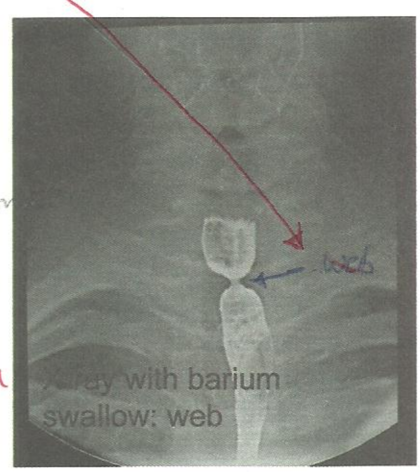


Def.: Chronic pharyngo-oesophagitis.
Cause: Unknown but may be iron deficiency.
Pathology:
- Atrophy of mucosa.
- Submucosal fibrosis → annular stricture (web formation).

Prognosis: Precancerous (post-cricoid carcinoma).
N.B.: It is more common in females.
Clinical picture:
1- Dysphagia: Chronic pharyngo-oesophagitis + web.
2- Angular stomatitis and glossitis.
3- Achlorhydria: Atrophy of gastric mucosa.
4- Pallor: Due to anaemia.
5- Koilonychia (Sponning of nails).
6- Splenomegaly.

Investigations:
- CBC.
- X-ray with barium swallow.
- Oesophagoscopy.

Treatment:
1- Correction of anaemia: iron.
2- Repeated dilatation.
3- Regular follow-up (as the condition is precancerous).


X-ray with barium swallow: web

Ulcers of the mouth and pharynx (Stomatitis)

Def.: Ulcer means loss of continuity (interruption) of surface epithelium.

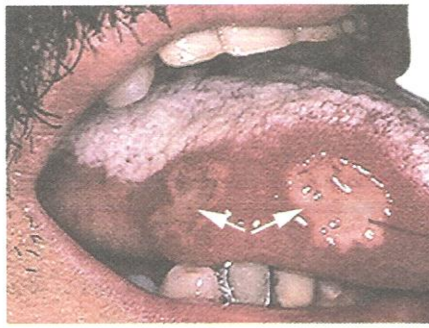
Causes

1- Traumatic:

a- Mechanical: Lacerating injury.
Maldirected tooth.

b- Chemical: Corrosives.

c- Physical: Radiotherapy.



Tongue ulcers in AIDS

2- Inflammatory:

1. Acute. 2. Chronic. 3. Dyspeptic

1. Acute:

I. Viral

- Herpes Simplex (H.S. virus).
- Herpes zoster (H.Z. virus)
- Herpangina (Coxsakie virus).
- AIDS: may lead to persistent ulcerations with moniliasis and gingivitis.

All characterized by: vesicles which rupture causing ulcers.
H.S. affects anterior part while herpangina affect posterior part of the pharynx
H.Z. accompanied by vesicles and pain (neurotropic virus).

II. Bacterial:

- Severe pharyngitis and tonsillitis.
- Diphtheria.
- Vincent's angina.
- Cancrum oris (Gangrene of the floor of mouth).

III. Fungal: Moniliasis

2. Chronic:

- T.B.: The ulcer has undermined edge, surrounded by pallor.
- Syphilis: 1ry (Chancre)
  2ry (Snail track ulcer and mucous patches).
  3ry (Ulcer with punched out edge).

3. Dyspeptic (aphthous ulcers): the exact cause is unkown
Multiple, small, painful, recurrent and yellowish ulcers associated with GIT troubles.

3- Neoplastic:

Malignant ulcer: Raised everted edge, irrigular necrotic floor and indurated base.

4- Blood Diseases:

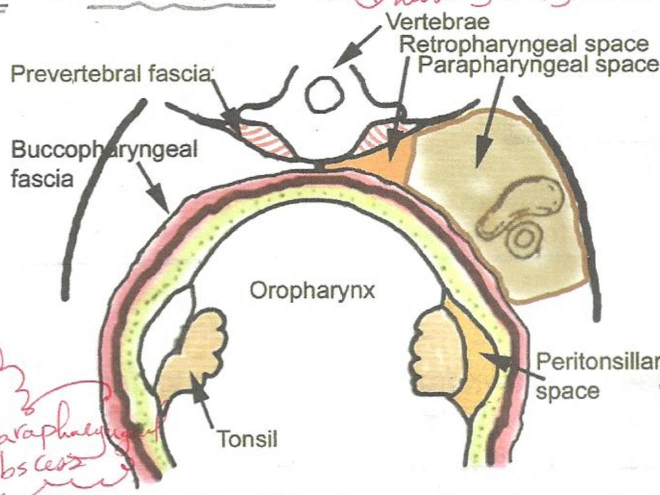
- **Agranulocytosis:** Oropharyngeal ulcers surrounded by little inflammatory reaction.
- **Leukaemia:** Oropharyngeal ulcers with lymphadenophthy, pallor,and bleeding tendency
- **Infectious mononucleosis:** Oropharyngeal ulcers with lymphadenopathy, fever and palatal petichiae with +ve Paul-Bunnel test.

5- Skin Diseases:

- **Pemphigus:** Bullae $\xrightarrow{\text{Rupture}}$ ulcers.
  Biopsy → Intraepithelial lesion + acantholysis.
- **Pemphigoid:** Bullae $\xrightarrow{\text{Rupture}}$ ulcers.
  Biopsy → Subepithelial lesion + no acantholysis.
- **Behcet's disease:** Oropharyngeal ulceration.
  Genital ulceration.
  Iridocyclitis.
- **Drug eruptions:**
  Hypersesitivity lead to: Vesicles $\xrightarrow{\text{Rupture}}$ ulcers.

Pharyngeal Suppurations

Infections of the spaces around the pharynx



Spaces around the pharynx (transverse section)

Peritonsillar abscess (Quinsy):

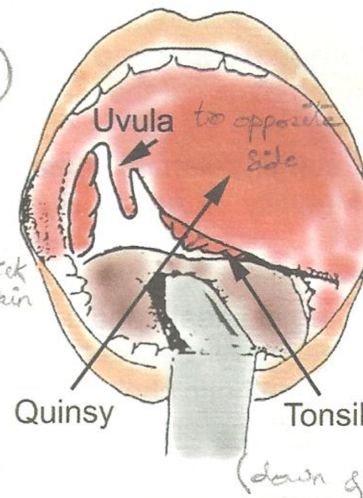
Def.: Collection of pus in the peritonsillar space.

Peritonsillar space:

Present between capsule of the tonsil and its bed (superior constrictor) at its upper pole.

Cause:

Acute tonsillitis, infection starts in the crypta magna, then pass to the peritonsillar space.



Clinical picture:

Symptoms:

-General: Fever, headache, malaise and anorexia.

-Local:

1- Dysphagia and odynophagia with drippling of saliva

2- Neck pain behind the angle of mandible referred to the ear

3- Trismus.

4- Torticollis.

Signs:

-General: ↑ temperature and ↑ pulse.

-Local:

1- Torticollis: Flexion of neck to the diseased side.

2- Trismus: Inability to open the Jaw.

3- Oropharyngeal examination: swelling above and lateral to the tonsil pushing the tonsil downwards and medially and pushing the uvula to opposite side.

4- Jugulodigastric LNs:enlarged, firm and tender

Complications:

- Laryngeal oedema.
- Extension → Parapharyngeal abscess.
- Pyaemia and septicaemia.

Differntial Diagnosis:

- Unilateral tonsillar enlargement (as tumour)
- Parapharyngeal swelling as carotid aneurysm (pulsations), parotid tumour or parapharyngeal abscess.

Treatment:

1- Before suppuration (in cellulitis): as acute tonsilitis

2- After suppuration (pus formation):

Indicated by:
- Fever become hectic.
- Pain become throbbing.
- Pitting oedema.
- Aspiration brings pus.

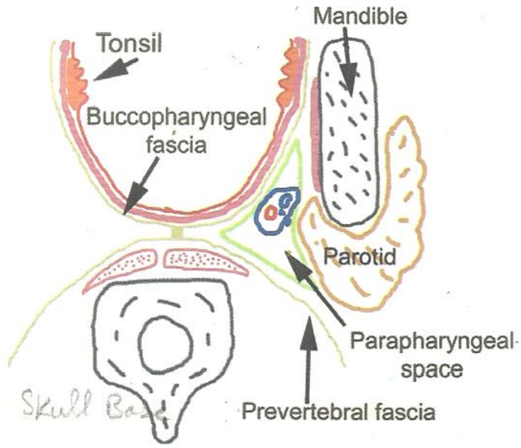
a. Incision and drainage:
- Under local or general anaesthesia.
- The knife must be gaurded to avoid deep injury.
- Site of incision: either in:

i-Most pointing point.
ii-Crypta magna.
iii-Mid-point of transverse line drawn from base of uvula to the last upper molar
iv-½ cm lateral to the meeting point between transverse line from base of uvula and vertical line along the anterior pillar.

b. Parenteral antibiotics + analgesic antipyretics.

c. Tonsillectomy:
Within one month from drainage (to avoid recurrence).
Sometimes quinsy-tonsillectomy (Incision of abscess +removal of tonsils) especially if the quinsy is posteriorly located.

2 Parapharyngeal abscess:

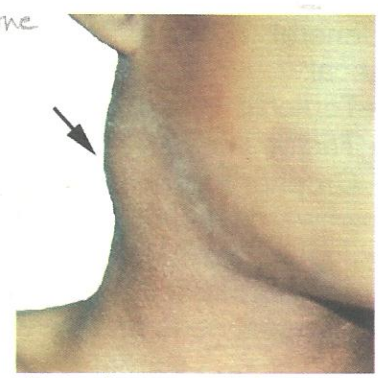


Def.: Collection of pus in the parapharyngeal space.
Parapharyngeal space: present on either side of the pharynx extends from skull base to the hyoid bone.
- Laterally: Ramus of mandible and parotid gland.
- Medially: Ant. → Buccopharyngeal fascia.
  Post → Prevertebral fascia.

Contents:
- Carotid sheath and its contents
- Deep cervical LNs along IJV.
- Sympathetic chain.
- Last four cranial nerves.

Causes:
- Peritonsillar abscess.
- Acute tonsillitis.
- After tonsillectomy.

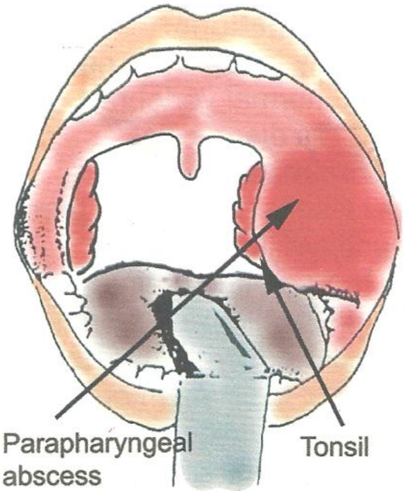
Clinical picture:


Parapharyngeal abscess

Symptoms:
-General: Fever, headach, malaise and anorexia.
-Local:
1- Dysphagia and odynophagia with drippling of saliva.
2- Neck pain behind the angle of mandible referred to the ear.
3- Neck swelling in the upper lateral part of neck.
4- Trismus.
5- Torticollis.

Signs:
- General: ↑ temperature and ↑ pulse.
- Local:
1- Torticollis: Flexion of neck to diseased side.

2- Trismus: Inability to open the Jaw.
3- Internal swelling: swelling lateral to the tonsil pushing it medially.
4- External swelling: below and behind the angle of the mandible deep to the anterior border of sternomastoid.



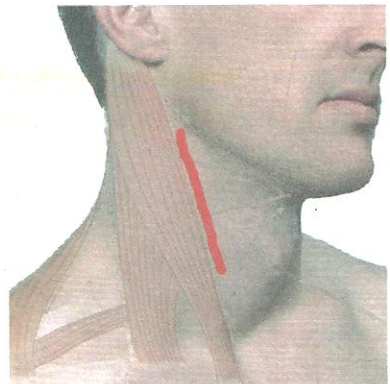
Beck's triad = parapharyngeal abscess
Formed of: 1- Internal swelling (as above).
2- External swelling (as above).
3- Trismus.

Investigations: CT is diagnostic.
Complications:
- Laryngeal oedema.
- Thrombosis of IJV.
- Rupture of carotid artery.
- Pyaemia and septicaemia.

Differntial diagnosis:
From other parapharyngeal swellings and quinsy.

Treatment:
- Hospitalization with parenteral antibiotics + analgesic antipyretics.
- Incision and drainage:

Indication: pus formation (as before)
Site of incision: External incision along the anterior border of sternomastoid muscle.


Incision for parapharyngeal abscess

Retropharyngeal Abscess:

a) Acute Retropharyngeal Abscess:

Def.: Collection of pus in retropharyngeal space.
Retropharyngeal space: Present posterior to the pharynx between buccopharyngeal and prevertebral fascia.
Cause: Suppurations in lymph gland of Henle (which atrophies by the age of 5 years) due to infection in nose, pharynx or tonsils.

Clinical picture:

Symptoms:
- General: Fever, headache, malaise and anorexia.
- Local:

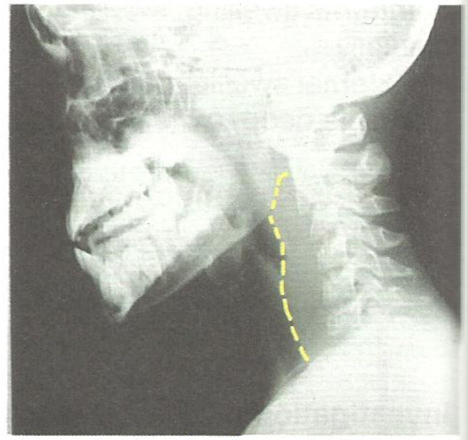
1-Dysphagia and odynophagia with drippling of saliva.
2-Torticollis: Flexion of neck forewards.
3-Nasal obstruction: Collection of pus behind nasopharynx.
4-Laryngeal obstruction: Collection of pus behind hypopharynx.



Signs:
-General: ↑ Temperature and ↑ pulse.
-Local:
1-Torticollis: Flexion of neck forewards.
2-Internal swelling: in the posterior pharyngeal wall to one side of mid-line limited by the median raphe.
3-External swelling: Enlarged, firm, tender deep cervical LNs.

Investigations:

- X-ray lateral view neck: widening of prevertebral space with normal vertebrae.
- CT is diagnostic.



X-ray: Acute retropharyngeal abscess

Treatment:

- Hospitalization with parentral antibiotics + analgesic antipyretics.
- Incision and drainage:

Indications → pus formtion (as before).
Under general anaesthesia.
Site of incision: Internal incision (in the pharynx), vertical over the abscess with the head low down (Trendlenberg's position), using suction apparatus and cuffed endotracheal intubation to avoid aspiration of pus.

b. Chronic Retropharyngeal Abscess:

Synonym: Cold abscess or Pott's disease of the spine.
Def.:T.B. with collection of caseous material behind the prevertebral fascia.

Clinical picture:

General:

- T.B. toxaemia:
    - Loss of weight.
    - Loss of apetite.
    - Night fever.
    - Night sweating.
- Pulmonary T.B.: Cough and Hemoptysis.

Local:

- Dysphagia and odynophagia with drippling of saliva.
- Internal swelling: in the mid-line of posterior pharyngeal wall.
- External tenderness and rigidity: over the cervical spines.

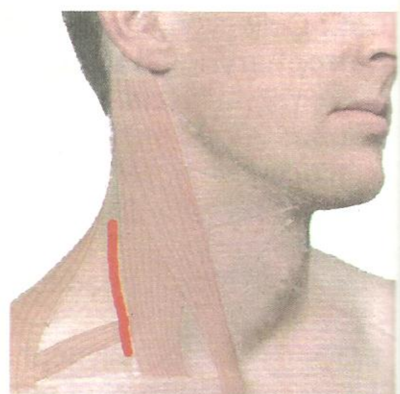
Investigations:

- X-ray lateral view neck: widening of prevertebral space with destroyed vertebrae.
- CT is diagnostic.
- Investigations for T.B.: as chest X-ray and sputum analysis.

Treatment:

- Antituberculous treatment: as rifampicin.
- Incision and drainage:

Site:External incision along the posterior border of sternomastoid muscle.



Incision for cold abscess

4 Ludwig's Angina:

Def.: Collection of pus in the submandibular space.

Submandibular space:

From the floor of mouth above to the deep fascia of the submandibular region below.

Cause:

- Dental infection: in most cases.
- Submandibular sialadenitis.



bscess

Clinical picture:

Symptoms:

- General:Fever, headache, malaise and anorexia.
- Local:

1- Dysphagia and odynophagia with drippling of saliva.
2- Neck pain: below the mandible.

Signs:

-General: ↑ temperature and ↑ pulse.

-Local:

1-Internal swelling: in the floor of the mouth pushing the tongue above and backwards

2-External swelling: in the submandibular region, First: it is indurated (hard, brawny), Later on: become flactuant (on pus formation).



Ludwig's angina

Complications:

1- Laryngeal oedema is common.
2- Pyaemia and septicaemia.

Commonest cause of death obstruction by toungue

Treatment:

- Hospitalization with parenteral antibiotics + analgesic antipyretics.
- Saving the airway: Tracheostomy in severe stridor.
- Incision and drainage:

Indication → pus formation (flactuation).

Site of incision: Transverse in the submandibular region.



Incision for Ludwig's angina



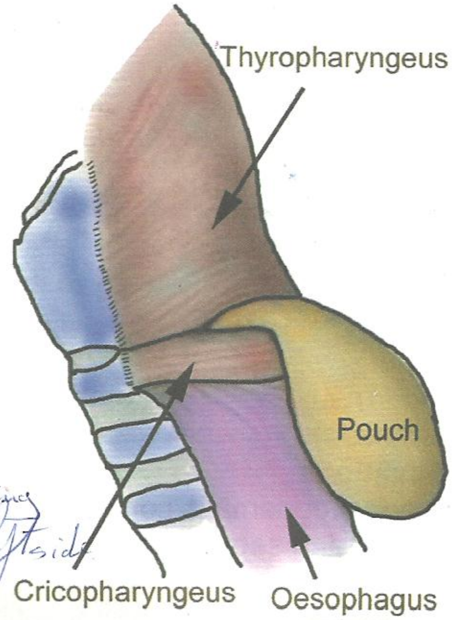
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Pharyngeal Pouch

Synonym: Zenker's diverticulum.

Def.: Herniation of pharyngeal mucosa through Killian's dehisence.

Killian's dehisence: the space between transverse cricopharynseus and oblique thyropharyngeus (i.e. area deficient of muscle coat).



Causes: ↑ Intrapharyngeal pressure due to either:
- Spasm of crico-pharyngeal sphincter.
- Failure of relaxation of crico-pharyngeal sphincter

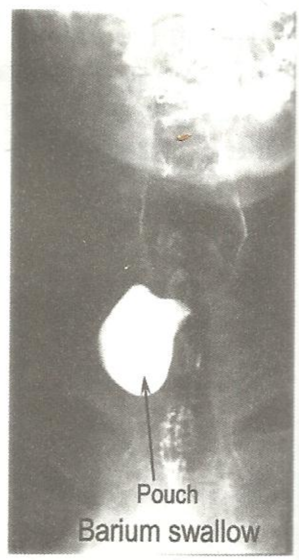
Clinical picture:

Symptoms:
- Dysphagia.
- Regurgitation of undigested food.
- Neck swelling on left side of the neck

Signs:

1- Hypopharynx:
Indirect laryngoscopy → Froth in pyriform fossa.

2- Neck:
Swelling on left side of the neck under sternomastoid which is:
- Cystic.
- Compressible.
- ↑ Coughing and straining.

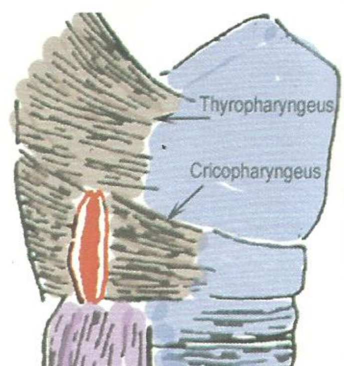


Investigations:
1- Barium swallow: Retort - shaped swelling.
2- Hypopharyngoscopy: froth or undigested food in pyriform fossa, the opening of the pouch may be seen.

Treatment:

1- Endoscopic treatment:
- Repeated dilatation of cricopharyngeal sphincter.
- Endoscopic diathermy of the septum between pouch and oesophagus.

2- Surgical:
- Cricopharyngeal myotomy.
- Excision of the pouch (diverticulectomy): with crico-pharyngeal myotomy to prevent recurrence.



Crico-pharyngeal myotomy

Tumours of the Pharynx

Nasopharynx:

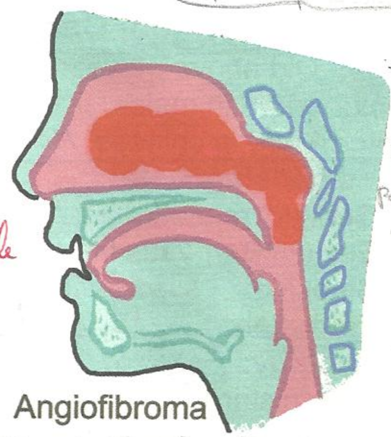
Benign: Angiofibroma (Nasopharyngeal fibroma).
Malignant: Sq. cell carcinoma: the commonest
Lymphoma: the 2nd common
Rhabdomyosarcoma: the 3rd common.

Angiofibroma (Lio Case) ♂ 12-16 years

Angiofibroma

Local Malignant T.

Def.: Benign, highly vascular, locally aggressive tumour of the nasopharynx.
Age: Around 12 years with spontaneous regression at sexual maturity.
Sex: Exclusively in males.
Causes: Unknown but may be:
-Benign tumour of the periostum of skull base.
-Hamartoma of vascular erectile tissue.
-Paraganglioma of maxillary artery.
-Hormonal disturbance results in hypertrophy of the periosteum of skull base.



Angiofibroma

Pathology
-Origin: Sphenopalatine foramen. (Sphenopalatine foramen)
-Gross picture: Firm, lobulated, pinkish tumour, has no true capsule. (No true Capsule)
-Microscopic picture:
Angio = vascular spaces without musculosa. → Massive Hge → Massive Epistaxis (No Biopsy)
Fibroma = collagen bundles and fibroblasts.
-Feeding vessel: mainly from maxillary artery.
-Behaviour: Either spontaneous regression (rare) at sexual maturity or extension to the surrounding structures.

Clinical picture

General:
a- Pallor (due to anaemia from epistaxis).
b- Stunted growth.
c- Face shows:
- Proptosis.
- Facial swelling.
- Frog-face deformity.


Frog face deformity

No Biopsy

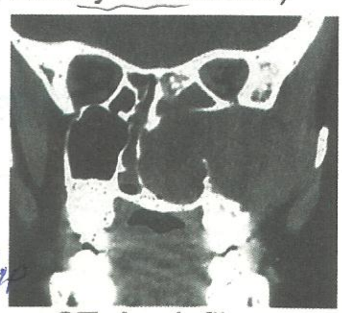
Nasal: in nasopharynx
Symptoms:
- Unilateral nasal obstruction.
- Intermittent epistaxis. (Severe) bec. no Capsule
- Unilateral nasal discharge.

Signs:
- Anterior rhinoscopy: Unilateral nasal mass which bleeds on touch. (Bleed on touch — glomus in ear)
- Posterior rhinoscopy: Lobulated pink mass.
- Digital palpation: contraindicated (except in the operating theatre, usually not needed) → Massive Bleeding

Aural: ET obstruction leads to conductive hearing loss (secretory OM or recurrent AOM)

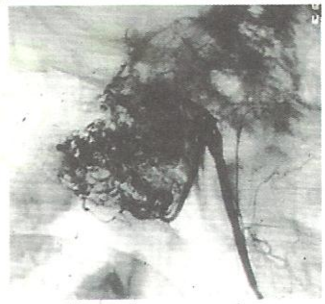
Differntial dignosis: Unilateral nasal mass (see Clinical ENT)

N.B. ***Young boy with unilateral nasal obstruction and epistaxis = Angiofibroma until proved otherwise***
① Antrochoanal polyp ② Angiofibroma ③ Tumour


CT: Angiofibroma

Investigations:
-CT to detect site, size and extension.
- Angiography
- MRI
- Biopsy Contraindicated *

- Carotid angiography: to see feeding vessel, and to do preoperative embolization.
- MRI and MRA (angiography): to detect intracranial extension.



Angiography

N.B.: Biopsy is contraindicated, and not needed

Treatment:

- **Surgical**: Surgical excision with preoperative embolizaiton.
- **Hormonal**: Combination of oestrogen + testosterone →↑ fibrous tissue + ↓ vascularity.
- **Radiotherapy**: Not done nowadays as it is carcinogenic except in recurrent cases with intracranial extension.

2 Nasopharyngeal Carcinoma:

Age: Old above 60 years.
Sex: More in males.
Race: More in chinese.

Predisposing factors:

- Genetic: related to HLA antigen.
- Epstein Barr virus infection.
- Smoking.
- Irradiation.

Pathology:

-Gross picture: Shape: ulcer, cauliflower mass or nodular infeltrative.
Site: the fossa of Rosen Muller is the commonest site.

-Microscopic picture: Sq. cell carcinoma is the commonest.

-Spread:

1) Direct: to the surrounding structures.
2) Lymphatic spread: Retropharyngeal then to upper deep cervical LNs.
N.B. Nosopharynx is midline structure, so bilateral nodal metastasis is common.
3) Blood spread: BBLL(Lung-Liver-Bone-Brain).

-Prognosis: bad as nasopharynx is a silent area, and midline.

Clinical Picture: ANNN

Aural manifestations:

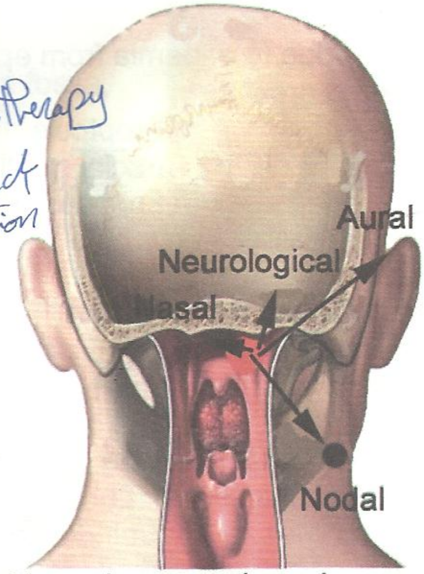
-Unilateral Secretory Otitis Media: due to obstruction of eustachian tube
-Reffered pain in the ear through 9th nerve.

Nasal manifestations:

-Nasal obstruction (unilateral or bilateral).
-Nasal discharge (unilateral or bilateral).
-Epistaxis.

Nodal manifestations:

-Upper deep cervical LNs may be felt.
-Incidence of metastasis = 70%.



Nasopharyngeal carcinoma

Neurological manifestations:

-Cranial nerve palsies: in this order of frequency:
.5th: unilateral facial pain, numbness then loss of sensation.
.Ocular(3^{rd}, 4^{th}, 6^{th}):squint, diplopia and ophthalmoplegia.
.Lower 4 cranial nerves: (compression by retropharyngeal LNs at skull base):

Trotter's traid (diagnostic for nasopharyngeal carcinoma):
1) Unilateral facial pain (trigeminal nerve).
2) Unilateral palatal immobility.
3) Unilateral conductive deafness.

Investigations:

-CT: to detect site, size and extensions of the tumour, and retropharyngeal LNs enlargement (which is not clinically palpable).
-MRI: to detect intracranial extension.
-Biopsy by: nasal endoscopy (under local anaesthesia).
-Metastatic work up.

Treatment:

-Radiotherapy: to 1ry tumour in the nasopharynx and to neck (for LNs) in both sides.
-Surgery: has no place as a primary treatment, it is done only (radical neck dissection) for persistent or recurrent LNs (after failure of radiotherapy).

Oropharynx

Benign: Papilloma or adenoma.
Malignant: Sq. cell ca. (75%) or Lymphoma (25%).

Malignant Tumours

Age: Old above 60 years (young in sarcoma).
Sex: more in males.
Predisposing factors:
- Somking.
- Alcohol.
- Irradiation.

Pathology:

-Gross: -Shape: Ulcer (in carcinoma), Mass (in lymphoma), or nodular infiltrative.
-Site: The commonest site is the tonsil and the base of the tongue
-Microscopic: Sq. cell ca or lymphoma.
-Spread: Direct - Lymphatic - Blood
N.B.: The specific LNs for tonsil and base of tongue is the jugulodiagastric.
-Prognosis: according to the stage of the tumour.

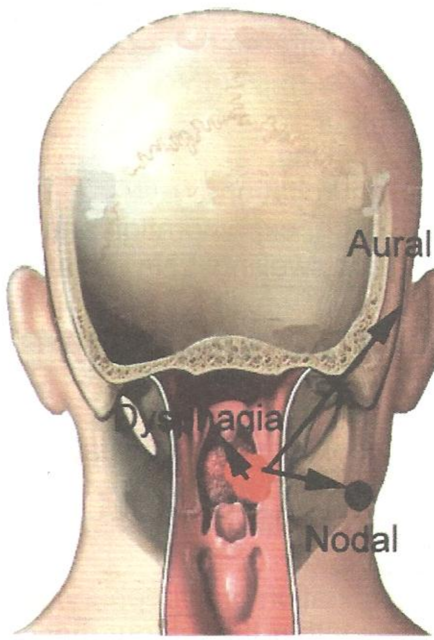
Clinical Picture:

Symptoms:
-Dysphagia.
-Pain in oropharynx referred to the ipsilateral ear.
-Symptoms of LNs metastasis: Neck swelling.
-Symptoms of blood metastasis: BBLL.

Signs:
-Oropharyngeal examination: Ulcer or mass.
-Neck examination: For LNs metastasis.
-General examination: For distant metastasis.

Investigations:
-CT: Site, size and extension and LNs metastasis.
-MRI.
-Biopsy: from the tumour itself.
-Metastatic work up.

Treatment:
-Radiotherapy: To 1ry tumour and LNs in the neck is the treatment of choice.
-Surgery: **Commando** operation in failed radiotherapy.
(**Com**bined neck dissection/**Mand**ibulectomy and/**O**ropharyngeal resection)

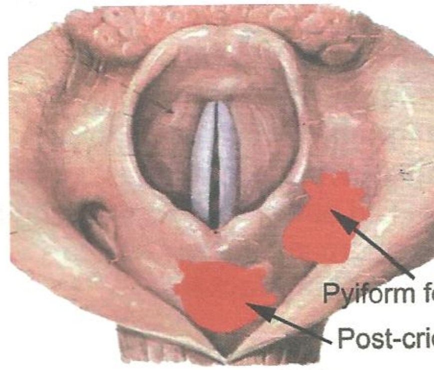


Oropharyngeal carcinoma

3 **Hypopharynx**

Malignant Tumour

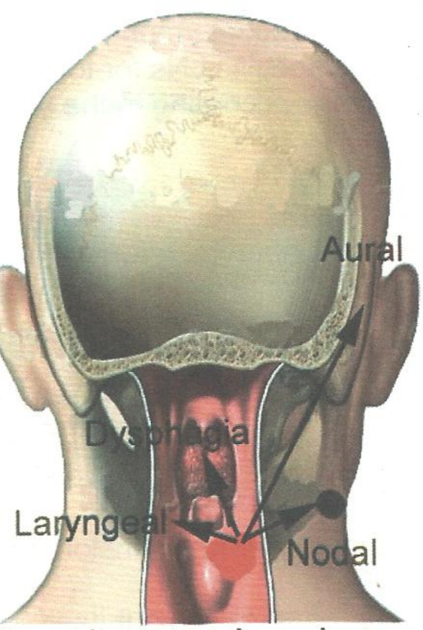
Age: Old above 60 years.
Sex: More in males.
Predisposing factors:
-Plummer-Vinson syndrome: leads to post-cricoid carcinoma.
-Smoking.
-Irradiation.
-Alcohol.
Pathology:
-Gross picture:
Shape: Ulcer, Cauliflower mass or nodular infeltrative.
Sites: Pyriform fossa (50%).
Post-cricoid (40%).
Posterior pharyngeal wall (10%).



-Microscopic picture: Squamous cell carcinoma
-Spread:
1- Direct spread: to the surrounding structures
2- Lymphatic spread:
To upper and lower deep cervical lymph nodes.
Post-cricoid is midline structure give bilateral nodal metastasis.
Postcricoid also give superior mediastinal LNs (bad prognosis).
Pyriform fossa is one of the silent areas.
3- Blood spread: BBLL
-Prognosis: Bad and the 5 year survival rate = 30%.

Clinical picture:

Symptoms:
1) Dysphagia; first to solid then to solids and fluids.
N.B.: Pyriform fossa is one of silent areas.
2) Pain reffered to ipsilateral ear.
3) Hoarseness of voice.
4) Stridor.
5) Chocking.
6) Regurgitation.
7) Cough, expectoration and may be hemoptysis.
8) Neck swelling: LNs. Enlargement.
9) Loss of weight.
10) Symptoms of distant metastasis.



Hypopharyngeal carcinoma

Sings:
General:
1) Underweight (cachexia).
2) Pallor and anaemia.
3) Signs of distant metastasis.
Local:
-Examination of hypopharynx (behind the larynx): by Indirect laryngoscopy to see either the tumour mass or froth collection in pyriform fossa or post-cricoid area.
-Examination of the neck:
a) Moure's sign: Friction of the cricoid cartilage to vertebrae showing absent click in postcricoid carcinoma.
b) Masses in the neck: LNs enlargement.

"هكذا أحب الله العالم"
+

Investigations:
- X-ray lat. view neck: widening of prevertebral space in postcricoid ca.
- Barium swallow: to see lower limit of the tumour.
- CT neck: To see site, size, and extension of the tumour and if there is LNs enlargement
- Direct laryngoscopy (D.L.) and biopsy.
- Metastatic work up.

Treatment:

Curative treatment: Combined surgery and radiotherapy.
- For 1ry tumour: Total pharyngo laryngectomy ± oesophagectomy followed by post-operative radiotherapy.
- For LNs: Radical neck dissection if there is LNs enlargement (RND).

Reconstruction after total Pharyngolaryngectomy: by one of the following methods
1. Stomach pull - up (the best).
2. Free radial forearm flap.

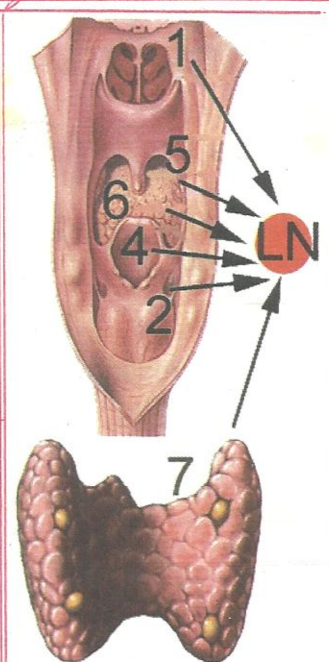
Palliative treatment: For extensive tumours fixed to vertebral column and/or with distant metastasis.
1. Radiotherapy.
2. Chemotherapy.
3. Surgery as tracheostomy for respiration and gastrostomy for feeding.
4. Pain killers (analgesics).
5- Adequate feeding.

lymph Metastasis before giving symptoms

Silent areas in the head and neck

Def.: Areas that may lead to lymph node metastasis (Neck swelling) before giving symptoms related to the affected area.

1- Fossa of Rosen-Muller (Nasopharynx).
2- Pyriform Fossa (Hypopharynx).
3- Floor of mouth.
4- Supraglottic area of larynx.
5- Tonsil.
6- Tongue base.
7- Thyroid.



Silent areas

* Nasopharynx —1ry→ Radiotherapy —fail→ RND
* Oropharynx —1ry→ Radiotherapy → Commando
* Hypopharynx —1ry→ Total pharyngolaryngectomy + oesophagectomy + Radiotherapy → RND

Hypopharynx
oesophagus Cancers → Malignant Loss of weight

سؤال مشكلة

The occult primary

Def.: The patient presented with neck mass (LNs enlargement) and the primary tumour (which cause LNs metastasis) is unknown.

The primary may be:

A) In the head and neck: One of silent areas (...........)

B) Below the level of clavicle:

1. Bronchus.

2. Breast.

3. Bowel.

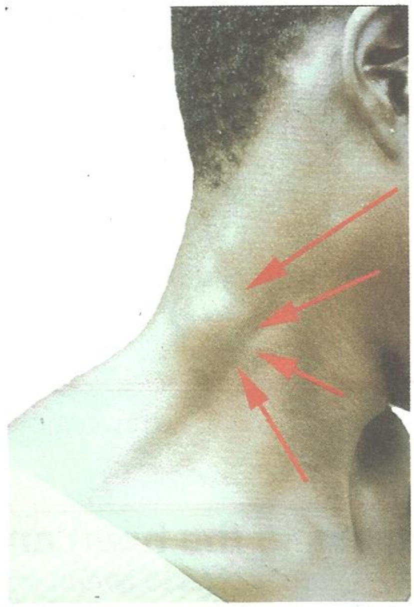
Management of occult primary:

A) History:

- Onset, Course, and Duration of the neck mass.
- Symptoms of head and neck diseases.
- Symptoms of chest diseases.
- Symptoms of bowel diseases.

B) Examination:

- Examination of the neck mass.
- Full head and neck examination.
- Chest examination.
- Abdominal examination.



C) Investigations:

1. Radiological:

- X-ray : head and neck, chest.
- CT: from skull base to chest.
- Barium swallow, and barium meal.
- Thyroid scan.

2. Hematological: CBC, ESR....

3. Pathological:

FNAB (Fine Needle Aspiration Biopsy) as open biopsy may lead to spillage of malignant cells.

4. Endoscopic:

Panendoscopy (all types of ENT endoscopies) and biopsy from any suspicious area.

Avoid removing the neck mass before discovery of the primary, this is because:

1. Spillage of malignant cells.
2. Your incision will interfer with the incision of radical neck dissection (RND) later on.
3. If the mass proved to be sq. cell carcinoma, it dose not indicate the site of the primary (as most of the primary tumour of head and neck are sq. cell carcinoma.
4. False sense of security for the patient.

* Panendoscopy → in occult primary & VC paralysis

Barium swallow

① plummer vinson
② Hypopharynx cancer
③ pharyngeal pouch
④ occult 1ry

Symptomatology

Snoring and sleep apnea

Snoring: Abnormal noise produced during sleep due to vibration of redundant oropharyngeal and/or hypopharyngeal tissues.

Apnea: Cessation of breathing for at least 10 seconds.

Types of Apnea:

1- Central: Respiratory center depression.
2- Peripheral (obstructive): Upper airway obstruction
3- Mixed: both.

Apnea index: Number of apneas/hour sleep.

Sleep apnea syndrome: More than 30 apneas/7 hour sleep.

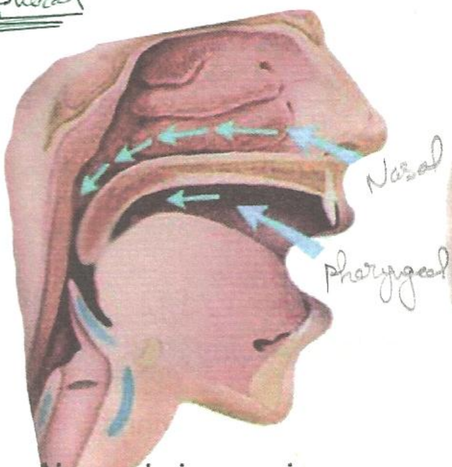
Causes of OSA (Obstructive Sleep Apnea):

(1) Nasal obstruction:

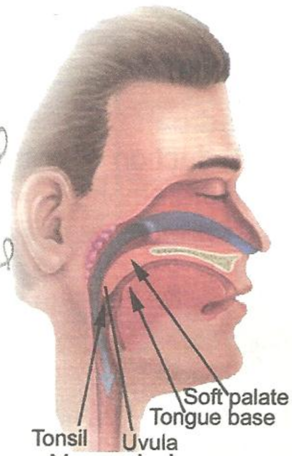
a. Bilateral nasal polypi.
b. Nasal packing.
c. Deviated septum (S shape).
d. Bilateral enlarged turbinates.

(2) Pharyngeal obstruction:

a. Large adenoid.
b. Tonsillar enlargement.
c. Large soft palate and uvula
d. Macroglossia (large tongue).
e. Micrognathia (small mandible).
f. Pharyngeal tumour.



Airway during snoring



Normal airway

Clinical picture:

Symptoms:

(1) Snoring, apnea and arousals:

- Increased when the patient lies on his back
- Arousals caused by apnea→ increase CO_2→ stimulation of respiratory center→ arousal.

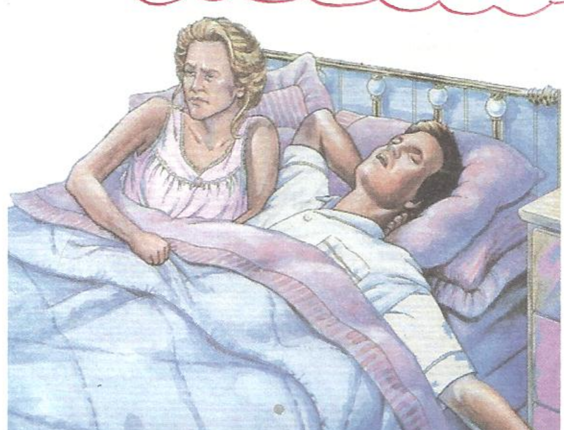
(2) Hypersomnolence by day.

(3) Morning headache and loss of concentration.

(4) Nocturnal eneuresis, hypertension and impotence.

N.B.: Severity of apnea increased by obesity, alcohol and sedatives.

Not every snorer has sleep apnea but it is present only in severe cases.



Signs:

General: Obesity, short neck and hypertension may be present.

Local: Nasal, nasopharyngeal, oropharyngeal and hypopharyngeal examination to detect cause of obstruction.

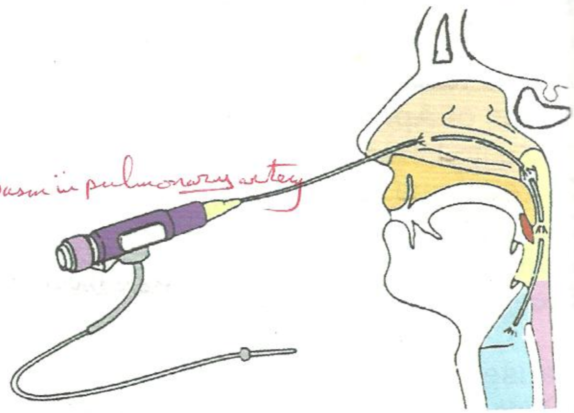
Investigations:

(1) Cephalometic study: X-ray and CT to detect site of obstruction.

(2) Flexible nasopharyngoscopy: Muller's manouvre which is: Suction of the airway after closure of nose and mouth with the nasopharyngoscope introduced to detect the most collapsed area.

(3) Rhinomanometry: to detect nasal resistance.

(4) Polysomnography: the patient stays a night in sleep lab. for measurement of the following:
ECG, EEG, EMG, pulse oximetry, nasal and oral airflow, chest and abdominal movements. It differentiate between obstructive and central apnea.



Flexible nasopharyngoscopy

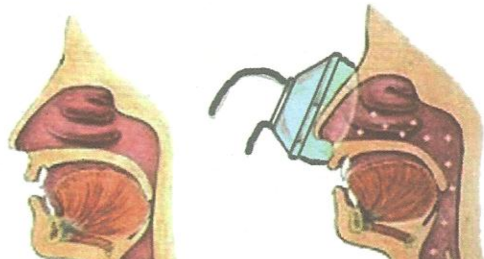
Complications:

1- Pulmonary hypertension.
2- Systemic hypertension.
3- Cor-pulmonale and heart failure.
4- Personality changes.
5- Familial troubles (divorce).
6- Sudden death.

Treatment:

I- Medical:

1. Reduction of body weight.
2. Avoid alcohol and sedatives.
3. Protriptyline: antidepressant.
4. Nasovent: to open the nasal valve.
5. Tongue retaining device.
6. CPAP (Continuous Positive Airway Pressure).



CPAP

II- Surgical: One of the following operations according to the site of obstruction.

1. Adenotonsillectomy in adenotonsillar hypertrophy.

2. Nasal surgery as SMR, turbinectomy or polypectomy.

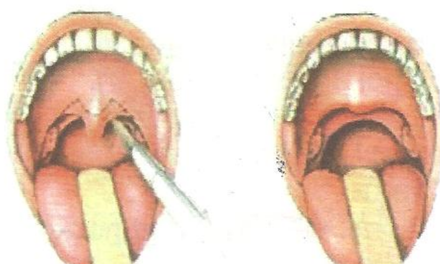


UPPP

3. Palatal surgery:
- UPPP (Uveopalatopharygoplasty): Reduction of the size of the uveola, soft palate and removal of the tonsils.
- LAUP (Laser assissted uveopalatoplasty).

4. Midline glossectomy in Macroglossia.

5. Mandibular advancement in micrognathia.



LAUP

6. Tracheostomy: in severe cases with no other options.

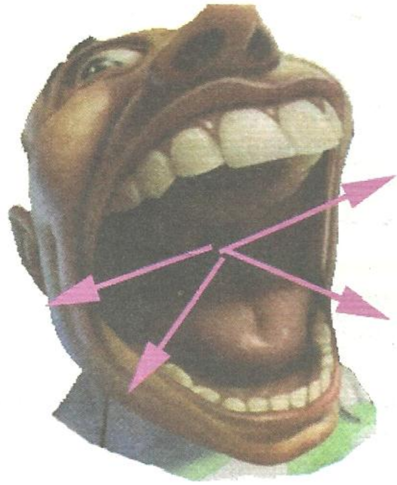
Foetor oris (Halitosis)

- Def.: Bad mouth odour.
- Causes:

1- Oral:
- Dental caries: The commonest cause.
- Bad oral hygiene.
- Oral ulcerations as vincent's angina.
- Ulcerating malignant tumours.

2- Nasal:
- FB in the nose.
- Sinusitis of dental origin.
- Atrophic Rhinitis.
- Ulcerating malignant tumours.

3- Pharyngeal:
- Acute,chronic tonsillitis and suppuration.
- Pharyngeal ulcerations as diphtheria.
- Pharyngeal pouch (contain undigested food).
- Ulcerating malignant tumour.



4- Oesophageal: Gastro-oesophageal reflux (GERD).

5- Pulmonary:
- Bronchiectasis.
- Lung abscess.

6- Metabolic:
- Diabetic → Acetone like odour.
- Uraemic → Urineferous odour.
- Hepatic → Sweety odour.

7- Physiological: Hungery and Fasting.

8- Psychological: Non existing odour.

Trismus

- Def.: Inability to open the jaw.
- Causes: either defect in the muscles of mastication or tempro-mandibular Joint (TMJ)



1- Muscular lesions:

a- Traumatic: Maxillo-facial trauma and tonsillectomy → spasm of masticatory muscles.

b- Inflammatory: as dental infection (peri-apical abscess in last molar), Quinsy and parapharyngeal abscess → spasm of masticatory muscles.

c- Neoplastic: Posterior extension of cancer maxilla → infeltration of masticatory muscles.

d- Miscellaneus: Tetanus (exotoxin) and tetany (Calcium defeciency) → spasm.

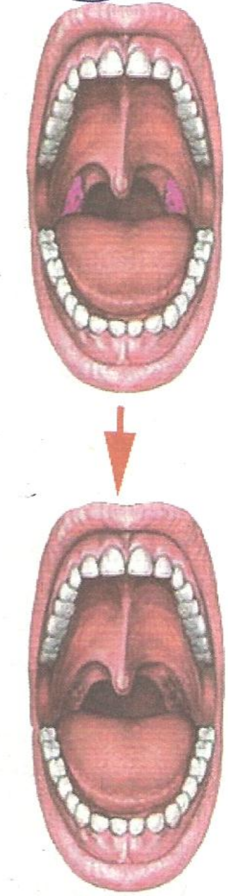
2- TMJ lesions: TMJ ankylosis may be due to:
- Traumatic: fracture mandibular condyle.
- Inflammatory: TMJ arthritis.

3- Hysterical.

Operations

Tonsillectomy

Indications:



1. Recurrent acute attack (more than 3 times/year).
2. One attack of quinsy (Once quinsy always quinsy, it is an old concept, recently in recurrent quinsy)
3. Chronic tonsillitis causing:
   - Septic focus.
   - Snoring and sleep apnea due to hypertrophy (the only absolute indication).
   - Dysphagia due to hypertrophy.
   - Persistent jugulodiagstric lymph nodes enlargement (may be T.B.)
   - Rheumatic fever or glomerulonephritis.
4. Diphtheria carrier: resistant to medical treatment.
5. F.B. in the tonsil: with difficulty to be removed.
6. Tumour of tonsil: either
   - Benign: papilloma.
   - Malignant: carcinoma or lymphoma.

Contraindications:

A. **Absolute:** Bleeding disorders as haemophilia, purpura, or leukaemia

B. **Relative**:

1. Acute tonsillitis.
2. Acute upper respiratory tract infection as common cold.
3. Active systemic disease (as diabetes).
4. Active rheumatic fever (↑ ESR).
5. Poliomyelitis: during epidemicity.
6. Menstruation: during menses.

Pre-operative preparation:

1. **History**:
   - To be sure from indication. (e.g. Number of attacks).
   - To exclude contraindications. (e.g. Fever, bleeding).
2. **Examination**:
   - To be sure from indication. (e.g. Chronicity).
   - To exclude contraindications. (e.g. acute inflammation).
3. **Investigations**:
   - ESR (first hour = 5-10).
   - CBC to detect anaemia (RBCs), leukaemia (WBCs) or purpura (platelets).
   - Co-agulation profile:
     - Bleeding time.
     - Clotting time.
     - Prothrombine time (12sec.) and concentration (100%).
     - Partial thromboplastin time.
4. **Pre-operative instructions:** Fasting for 6 hours.
5. **Pre-operative medications:**
   - Antibiotics: to prevent infections.
   - Atropine: to decrease secretions.
   - Aspirin: should be avoided 10 days before operation to avoid bleeding.

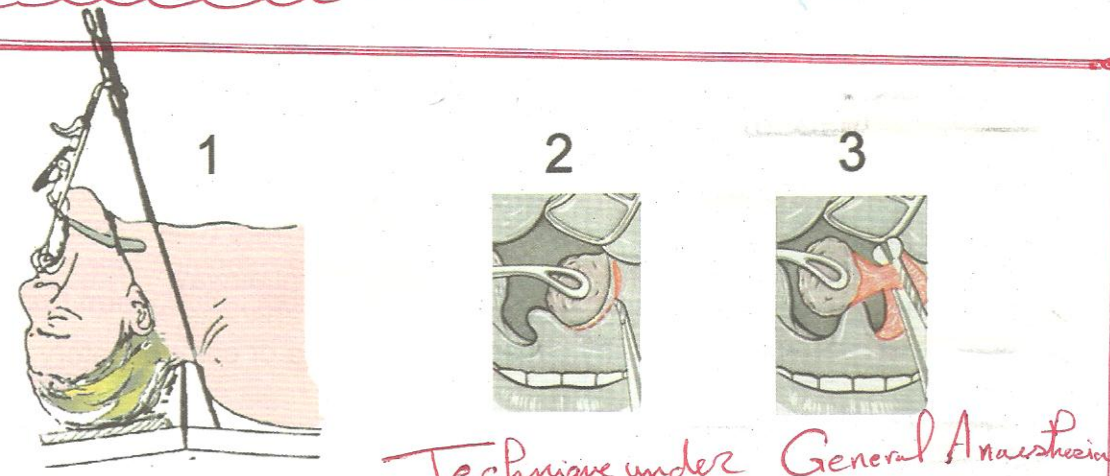
Technique: Under General anaesthesia (GA).

4 techniques have been described, but the most routinely used is the dissection

1. Dissection (the standard method).
2. Guillotine: not done nowadays due to high incidence of haemorrage, injury and

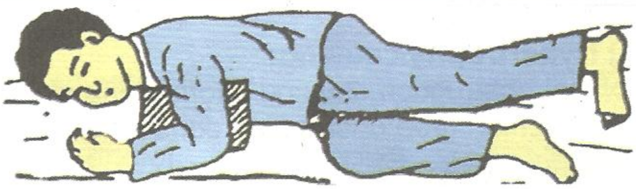
respiratory complications.

3. Laser: dissection or cryptolysis.
4. Cryosurgery: in bleeding disorders.



1- Position for tonsillectomy (supine) with maintaining the mouth opened by Davis-Boyle mouth gag.
2- Incision of the pillars (mucosa only).
3- Dissection of the tonsils and ligation of the blood vessels.

Post-operative Care:



1-**Position**: the patient lying on his side with the head down to prevent aspiration of blood, vomitus, or falling of tongue backwards.

2-**Extubation**: should not be carried out except after return of cough reflex.

3-**Observation of respiration:** Colour of lips: for cyanosis. Noise of respiration: stridor.

4-**Observation of bleeding**: indicated by
- -Frequent swallowing of blood.
- -Weak rapid pulse.
- -Hypotension.

5-**Antibiotics**: To prevent wound infection.

6-**Analgesics**: To decrease pain but avoid aspirin and non-steroidal anti-inflammatory.

7-**Feeding**: -Iced soft or semisolid foods (to ↓ bleeding)
-Early feeding is important, as frequent swallowing will prevent bleeding.

Complications:

[1] Anaesthetic complications:
- Anaphylactic shock.
- Apnea (succinyl apnea).
- Arrest (cardiac arrest).

[2] Haemorrhage: It may be

a. Primary: during the operation. It is due to inadequate preparation as bleeding disorders or acute infections.
Treatment: by ligation or diathermy of vessels or blood transfusion (fresh) in bleeding disorders.

b. Reactionary: within 24 hours. It is due to elevation of blood pressure (normalization) after recovery from halothane anaesthesia.
Treatment: In mild cases: local haemostatic and local pressure.
In severe cases: reanaesthesia and ligation of the bleeding vessels.

c. Secondary: within 10 days (Maximum at 7th day). It is due to wound infection.
Treatment: by Sedation and Antibiotics (↓ infection), Reanaesthesia (in severe cases) but ligation is impossible so we insert pack of gauze in the tonsillar bed then stitch the anterior to posterior pillars over it (ligation of wound is not done as the tissue is friable but ligation of external carotid in the neck can be done).

[3] Respiratory: either

a. Respiratory obstruction by:

- Extubation laryngeal spasm or inhalation of blood or vomitus:

Treatment by suction of blood and O_2 inhalation.

- Falling of tongue backwards:

Treatment by pulling of tongue and insertion of plastic oral airway.

b. Respiratory infection: Bronchitis, pneumonia, or lung abscess.

[4] Incomplete removal: which may cause haemorrhage or compensatory hypertrophy of the remnants.

[5] Injury: To palate, tongue or teeth.

[6] Infection:

- Wound infection causing 2ry haemorrhage.
- Respiratory infection.
- Parapharyngeal abscess.
- Systemic infection: bactraemia.

Adenoidectomy

Indications:

1) Hypertrophy causing:

-Nasal obstruction causing snoring and sleep apnea.

-Eustachian tube obstruction conductive deafness.

-Adenoid facies.

2) Recurrent infection:

-Rhinitis and sinusitis.

-Otitis media.

-Pharyngitis, laryngitis or bronchitis.

Contraindications: as Tonsillectomy, but it is contraindicated also, in cases of cleft palate, to avoid nasopharyngeal (Velopharyngeal) incompetence.

Pre-operative preparation and post-operative care: as Tonsillectomy.

Technique:

-Under general anaesthesia.

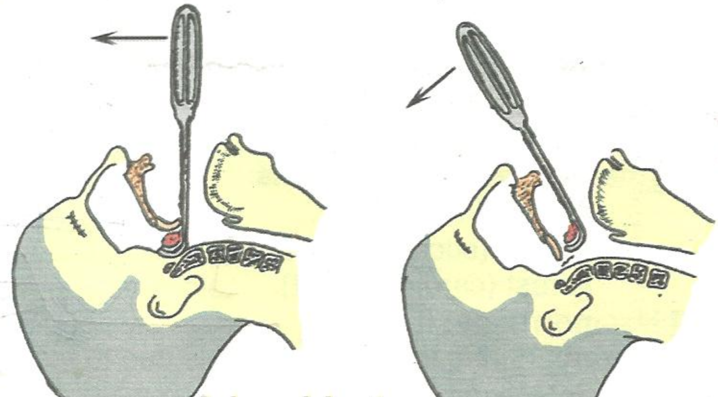
-The patient lying supine on the back with the head slightly flexed (in tonsillectomy → extended).

-The adenoid is shaved with curette.

-Pack inserted for 10 minutes.

Complications:

as tonsillectomy + injury to prevertebral muscles and ET opening and also may lead to velopharyngeal incompetence.



Adenoidectomy

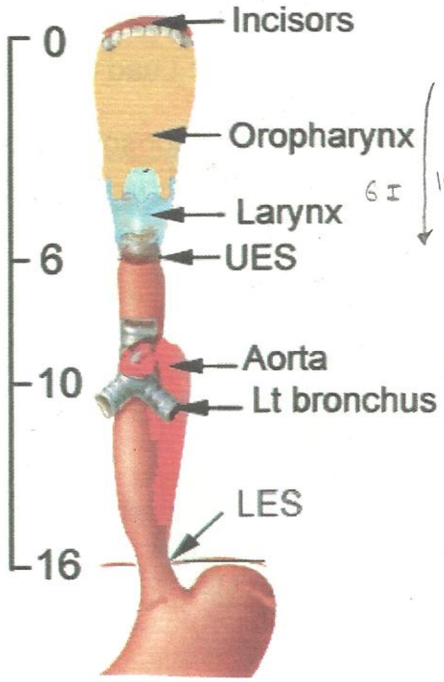
N.B.: all types of post-denoidectomy bleeding treated by post-nasal pack.

Adenotonsillectomy: The adenoid should be removed first with the head slightly flexed then remove the tonsils (this is to allow time for haemostasis after packing the nasopharynx and during this time tonsillectomy will be carried out then remove the nasopharyngeal pack).

Oesophagus

Anatomy:

-It is a fibromuscular tube 25cm (10 inches) long extending from the level of cricoid cartilage (C6) to the cardiac sphincter (T12).
-It has 3 constrictions:
1-Upper oesophageal sphincter (crico-pharyngeal-UES): 6 inches (15 cm) from central incisors.
2-At the level of crossing of Aortic arch and left main bronchus: 10 inches (25cm) from central incisors.
3- Lower oesophageal sphincter (cardiac-LES): 16 inches (40cm) from central incisors.



Congenital Diseases:

- **Atresia.**
- **Tracheo-oesophageal fistula.**

Traumatic diseases:

Foreign body in the oesophagus

Type of FB and Type of the patients:
- Coins in children.
- Fish or meat bone in adults.
- Denture in old age.
- Razors or pins in prisoners and mentally retarded patients.

Site of impaction:
- Below the cricopharyngeal sphincter at the upper end of the oesophagus.
- At the sites of constrictions.

Clinical picture:

- Dysphagia.
- Regurgitation.
- Pain.

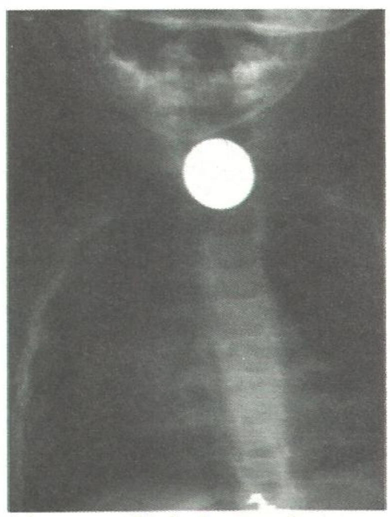
N.B.: A coin may remain latent for weeks or even months.

Investigations:

- Plain X-ray → to show radio-opaque FB.
- Barium swallow → to show radiolucent FB.
- Oesophagoscopy.

Treatment:

Oesophagoscopy and removal.



X-ray: coin in hypopharynx

Corrosive Oesophagitis

-Swallowing of corrosive materials is usually accidental in children and suicidal in adults.
-It may be:
- Alkalies: as Caustic potash
- Acids: rare.

Management: Passes into 2 stages

1- Acute stage:

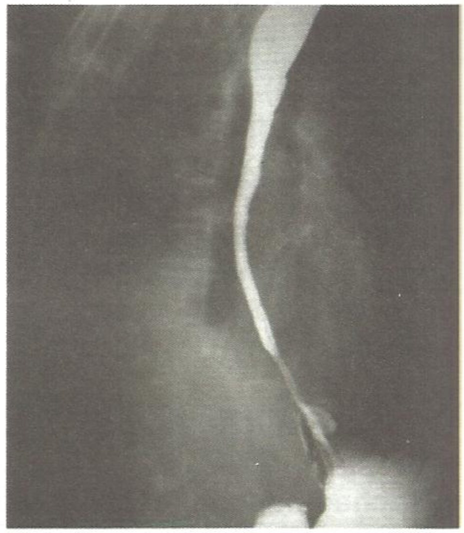
a. Local: - Dysphagia and pain due to ulcerations in mouth, pharynx and oesophagus.
- Stridor due to laryngeal oedema.

b. General: Shock either neurogenic (pain) or hypovolaemic (Dysphagia)

Treatment:
1- Immediate demulcent: milk and egg white.
2- Antibiotics.
3- Steroids: to prevent oedema (early) and fibrosis (late).
4- A rubber nasogastric tube may be used in the 1st few days.

2- Chronic stage: Lead to stricture oesophagus due to fibrosis.
1- Dysphagia: first for solids then for solids and fluids.
2- Regurgitation.
3- Loss of weight.

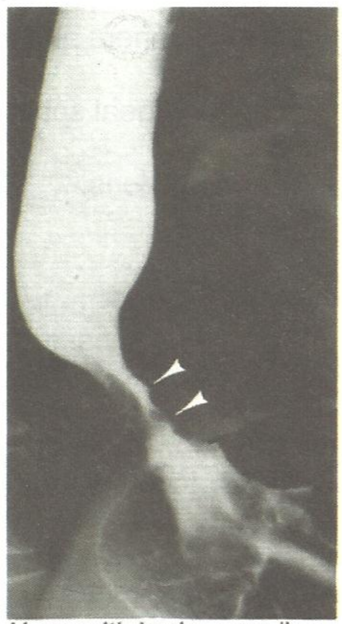
Investigations:
- Barium swallow: showing site, length and degree of stricture.
- Oesophagoscopy: Showing white fibrous concentric narrowing.


Barium swallow: oesophageal stricture

Treatment:
1- Permeable stricture: Repeated dilatation using elastic dilator through the oesophagoscope.
2- Impermeable stricture: either
  - Gastrostomy.
  - Colon by pass.

Tumours of the Oesophagus:
Benign: Fibroma and Lieomyoma.
Malignant: Carcinoma.

Cancer Oesophagus


X-ray with barium swallow: cancer oesophagus

Age: Old.
Sex: Male
Predisposing factor:
1. Smoking.
2. Alcohol.
3. Irradiation.
4. Plummer-Vinson syndrome.

Same of Tumours of Hypopharynx

Pathology:
-Gross:
Shape: Ulcer, cauliflower or nodular infiltrative.
Site:
- Lower 1/3 (commonest).
- Middle 1/3.
- Upper 1/3.

-Microscopic: Sq. cell ca. or adenocarcinoma.
-Spread: Direct, Lymphatic and Blood.
-Prognosis: Bad

Clinical Picture:
-Dysphagia: progressive, starts for solids then solids and fluids.
-Loss of weight.
-Regurgitation.
-Pain
-Hematemesis and melena.

Rat Tail in Barium

Investigations:
-Barium swallow: Rat-tail appearance with irregular filling defect

-Oesophagoscopy: and take a biopsy.
-Metastatic work - up.

Treatment:

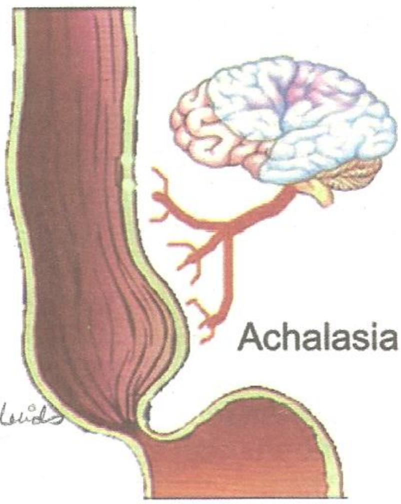
- **Curative:** in operable cases.
a- Surgical: Excision and re-anastomosis
b- Radiotherapy.
- **Palliative:**
a. Painkillers.
b. Surgical: gastrostomy or colon by pass.
c. Radiotherapy: by Souttar's tube containing radioactive material.
d. Chemotherapy.
e. Adequate nutrition.

N.B.: Cause of stricture oesophagus:

1- Congenital atresia.
2- Traumatic: Corrosive. → chronic
3- Inflammatory: Plummer-Vinson's syndrome.
4- Neoplastic:
Benign → Leiomyoma.
Malignant → carcinoma.
5- Miscellaneous: Scleroderma.

* No Loss of weight
* Dysphagia → More to fluids

Achalasia of the Cardia

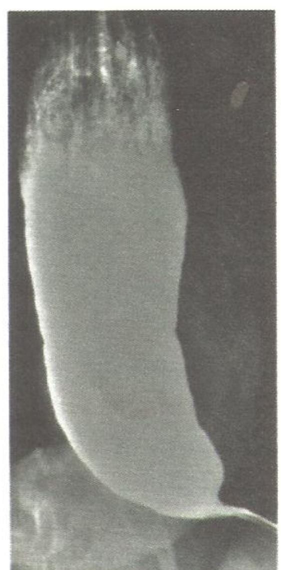


Def.: Dilatation of lower $^{2}/_{3}$ of the oesophagus.
Cause: Defect in Aurbach's plexus lead to either:
- Failure of relaxation of cardiac sphincter.
- Spasm of cardiac sphincter.

Clinical picture: More common in middle age neurotic females.
1- Dysphagia: - More for fluids than for solids.
- Intermittent after nervous shock.
2- Regurgitation of undigested food.
3- No loss of weight.

Investigations:
- Barium swallow: dilated lower $^{2}/_{3}$ of oesophagus with smooth tapering lower end. → parrot peak appearance
- Oesophagoscopy.

Treatment:
- **Medical:** - Sedatives (neurotic patients) as Diazepam.
- Muscle relaxant (cardiospasm).
- **Surgical:** - Dilatation of cardiac sphincter.
- Cardiomyotomy (Heller's operation).
- Cardioplasty.

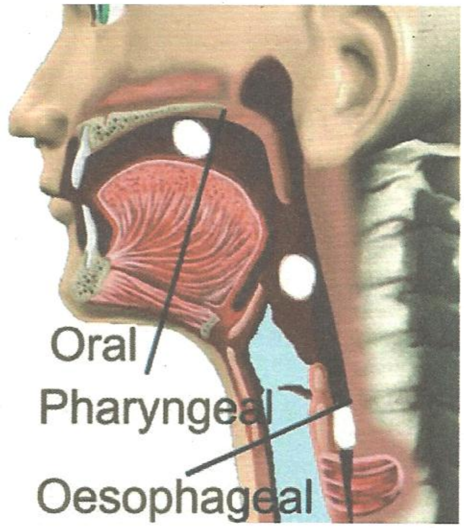

X-ray with barium swallow: achalasia

Globus Hystericus (Globus pharyngis)

Def: Sensation of a lump in the throat with no organic cause.
Aetiology: Unknown but may be psychological caused by cancer phobia.
Clinical picture: Sensation of a lump (usually in mid-line) during swallowing of saliva (absent in swallowing of food).
Investigations: Barium swallow-video fluoroscopy and endoscopy → normal.
Treatment: Psychological reassurance.

Symptomatology

Dysphagia:



Def.: Difficulty or mere sensation of swallowing.
N.B.: Odynophagia is a painful swallowing.

1- Oral Causes:

a. Congenital: Cleft palate.
b. Traumatic:
-Mechanical: lacerating injury or misdirected tooth.
-Physical: radiotherapy.
-Chemical: corrosive.
c. Inflammatory: Stomatitis - Glossitis - Dental caries.
d. Neoplastic: Cancer tongue.
e. Miscellaneous: Paralysis of cheek (7th).
Paralysis of palate (10th).
Paralysis of tongue (12th).

2- Pharyngeal Causes:

a. Congenital: Cleft palate.
b. Traumatic: as Oral cause.
c. Inflammatory:
- Acute: Pharyngitis, tonsillitis and suppurations.
- Chronic: Plummer - Vinson's syndrome.
d. Neoplastic: All types of pharyngeal carcinoma.
e. Miscellaneous: Pharyngeal pouch.

3- Oesophageal Causes:

A. In the lumen: FB

B. In the wall:

a. Congenital: -Atresia.
-Tracheo-oesophageal fistula.
b. Traumatic: -Mechanical: FB and oesophagoscopy.
-Physical: Radiotherapy.
-Chemical: Corrosive.
c. Inflammatory:
Acute: oesophagitis in exanthemata.
Chronic: -Plummer Vinson's syndrome.
-Reflux oesophagitis (GERD).
d. Neoplastic: Benign $\rightarrow$ leiomyoma.
Malignant $\rightarrow$ carcinoma.
e. Miscellaneous: Achalasia of the cardia.

C. Outside the wall:

1- In the neck:
a. Large goiter (especially cancer thyroid).
b. Large malignant lymph nodes.
c. Pharyngeal pouch.

2- In the chest:
a. Retrosternal goiter.
b. Mediastinal syndrome: Cardiomegaly-Aortic aneurysm - Bronchogenic carcinoma - Thymoma.
c. Dysphagia Lusoria: Compression of the oesophagus by vascular loop as double aortic arch.

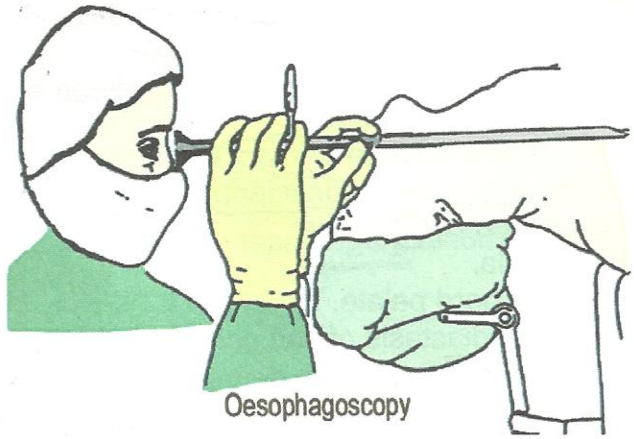
3- In the abdomen: Enlarged left lobe of liver.

Oesophagoscopy

Def.: Direct visualization of the oesophagus by the use of oesophagoscope under general anaesthesia (N.B. flexible oesophagoscopy done by gastroenterologist under sedation).

Indications:

1- Diagnostic:
To detect the cause of dysphagia.
To take abiopsy from tumour
2- Therapeutic:
To remove FB.
To remove benign tumour.
To dilate stricture.


Oesophagoscopy

Contraindications:

Aortic aneurysm
Acute stage of corrosive oesophagitis.
Severe Kyphosis.

Complications:

Perforation of the oesophagus, which lead to:
1- Pain: retrosternal and severe.
2- Dysphagia.
3- Shock: neurogenic (pain) or hypovolaemic (dysphagia).
4- Fever and toxaemia: due to infection.
5- Dyspnea: due to infection (mediastinitis) or pneumothorax.
6-Surgical emphysema; neck and mediastinum
7- X-ray
- Air in neck and Mediastinum (surgical emphysema).
- Air in pleura (Pneumothorax).
8- Treatment:
(1) Hospatiliztion.
(2) I.V. Fluids (nothing by mouth)
(3) Antibiotics.
(4) Incision (external) and drainage with closure of perforation in severe cases.

The Palate

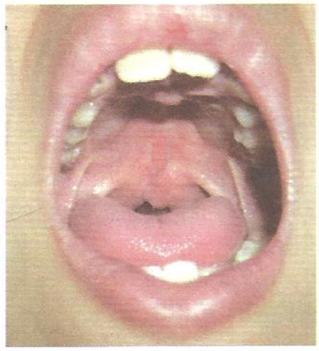
-The palate is formed of 2 parts:
1- Hard palate: present anterior, separating oral cavity from nasal cavity.
2- Soft palate: present posterior, separating oropharynx from nasopharynx.

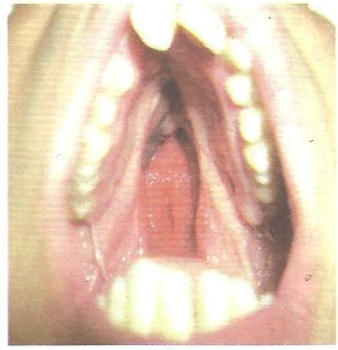
Cleft Palate

- Types:

1- Submucosal cleft:
The palatal mucosa is intact while the palatal muscles are deficient.
Diagnosed by 3 criteria:
Bifid uvula.
Notched hard palate.
Muscular diastasis of soft palate

2- Overt cleft: varies in degree
a- Cleft soft palate.
b- Complete cleft palate (hard and soft).


Normal palate


Cleft palate

Clinical picture:
Velopharyngeal incompetence lead to
- Escape of fluids (nasal regurgitation)
- Escape of speech (Rhinolaia aperta).

Treatment:
Surgical repair at preschool age followed by speech therapy.

Palatal and pharyngeal paralysis

- **Nerve supply:** by pharyngeal plexus.

Causes:
1- Intracranial (i.e. central): see Vocal cord paralysis.
2- Cranial (skull base lesions): see vocal cord paralysis.

Clinical picture:

Palatal paralysis:

- Unilateral palatal paralysis:
Symptoms: Asymptomatic (compensation by healthy side).
Signs: The uvula is deviated to the healthy side on phonation (saying AH).

- Bilateral palatal paralysis:
Symptoms: Nasal regurgitations.
Rhinolalia aperta.
Signs: The palate is immobile during phonation.

Pharyngeal paralysis:

-Unilateral pharyngeal paralysis:
Symptoms: Asymptomatic (compensation by healthy side)
Signs: Loss of pharyngeal reflex on affected side.

-Bilateral pharyngeal paralysis:
Symptoms: Chocking
Dysphagia (more to fluids)
Signs: Loss of pharyngeal reflex on both sides.

Investigations: Videofluroscopy.

Treatment:
1- Treatment of the cause

" من جرب من الجنيه يجرب من الله "

2- Unilateral paralysis (palatal or pharyngeal): need no treatment
3- Bilateral paralysis:
Palatal paralysis: Nasogastric tube
Or
Denture with posterior palatal extension
Pharyngeal paralysis: Nasogastric tube.
Tracheostomy may be needed in severe cases (Chocking).

Velopharyngeal incompetence

Def.: Failure of the palate to be elevated and close the nasopharynx lead to escape of air during speech (rhinolalia aperta) and fluids during swallowing (nasal regurgitation).

Causes:

1- Congenital: Cleft palate.
2- Traumatic: Mechanical: penetrating injury.
Chemical: Corrosive: fibrosis.
Physical: Radiotherapy: fibrosis.
3- Inflammatory: Syphilis → Perforation of hard palate.
4- Neuromuscular: Palatal paralysis. → Bilat.
5- Miscellaneous: Functional disorders
Where there are no organic lesions but the cause is faulty speech learning.

Clinical picture:

* Rhinolalia aperta (Hypernasality).
* Nasal regurgitation.
* Difficulty suckling in infants.
* Ear troubles (ET dysfunction).

Treatment:

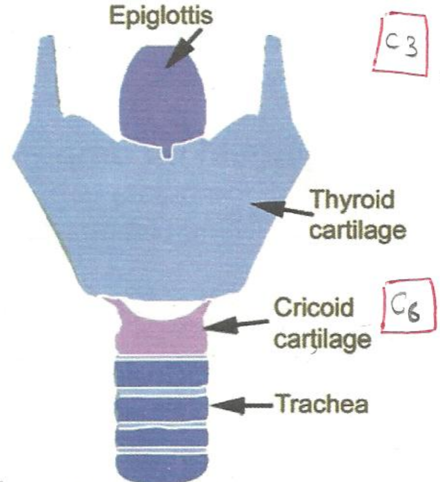
1- Treatment of the cause as
a- Repair of cleft palate (palatoplasty).
b- Pharyngoplasty or pharyngeal flap (narrowing of velopharyngeal sphincter).
2- Speech therapy.

Larynx

Larynx

Anatomy

The Larynx is the voice box formed of cartilages, connected to each other by ligaments, moved by muscles, lined by mucous membrane.



Anterior view

The Level:

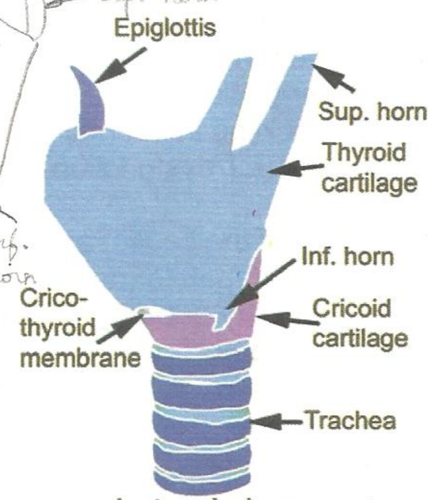
- From C_3-C_6
- Extends from tip of epiglottis to lower border of cricoid cartilage
- Infront of the hypopharynx.

Cartilages: 3 single + 3 paired

A) Single cartilages:

1- Thyroid cartilage:-

- It resembles Open book.
- Formed of 2 plates (alae) fused anterior at an angle (90 - 110°) which is deficient superior forming thyroid notch.
- Each ala has superior and inferior horns



Lateral view

2- Cricoid cartilage:-

- Signet ring in appearance.
- Formed of narrow anterior arch and wide posterior lamina.

3- Epiglottis:

- It is a leafe like, fibro-elastic.
- Its lower part (petiol) attached to the mid-point of posterior surface of thyroid angle.
- It has multiple pits on its surface caused by the seromucinous glands (easy spread of supraglottic carcinoma to pre-epiglottic space).

B) Paired cartilage:

1- Arytenoid cartilage:

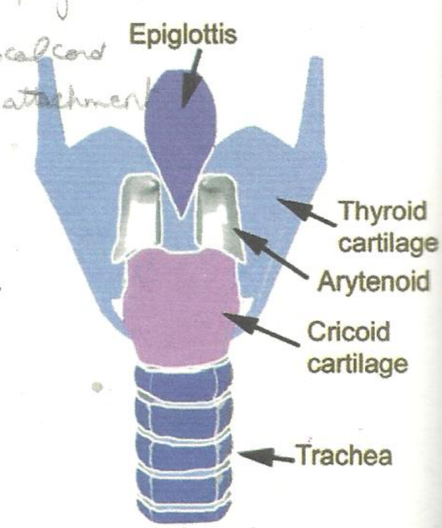
- Pyramidal in shape, it has apex directed upwards and base articulating with the upper surface of posterior part of cricoid (lamina),
- It has vocal process directed anteriorly for attachment of vocal cord, and muscular process directed laterally for muscle attachment.

2- Corniculate cartilage:

Articulates with the apex of arytenoid.

3- Cuniform cartilage:

Present on the aryepiglottic fold.

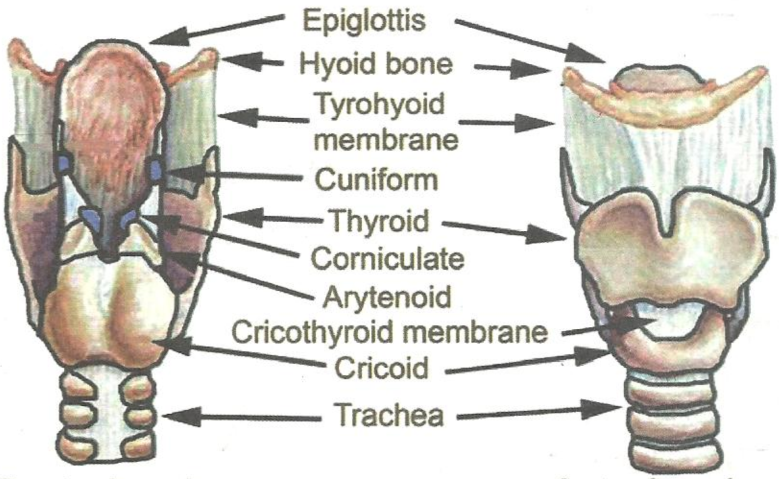


Posterior view

"ها أنا معكم كل الأيام وإلى انقضاء الدهر"
+

Ligaments and membranes: 5 + 2

1- Thyrohyoid: Between hyoid bone and thyroid cartilage.
2- Cricothyroid: Between cricoid and thyroid cartilages.
3- Cricotracheal: Between cricoid and trachea
4- Hyo-epiglottic: Between hyoid bone and epiglottis.
5- Thyro-epiglottic: Between thyroid and epiglottis.

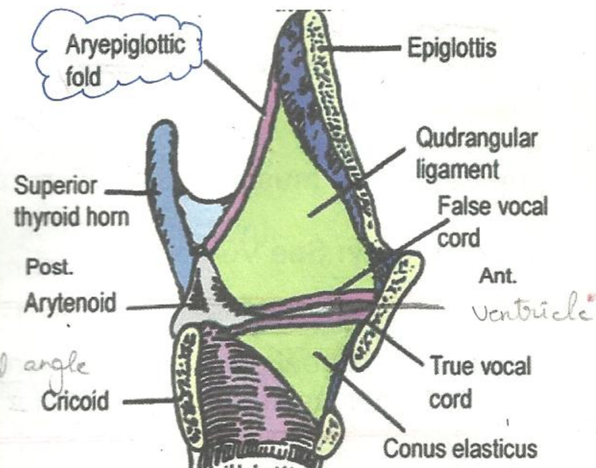


Posterior view   Anterior view

N.B.: There are 2 intrensic ligaments (which is very imporant for laryngeal support)present under mucosa.

1- Quadrangular ligament:
Between ary-epiglottic fold above and false vocal cords below.

2- Conus elasticus: CCC
Between cricoid cartilage below to the true vocal cords above.
→ to post. surface of thyroid angle



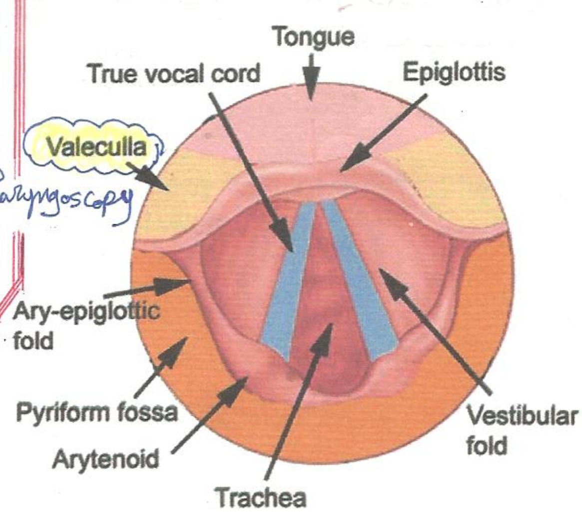
Sagittal section

Laryngeal folds:

1-True vocal cords (vocal fold, VC):
Attached anterior to the midpoint of the posterior surface of thyroid angle and posterior to the vocal process of arytenoid.

2-False vocal cords:
Above the level of the true vocal cords.
N.B.: The space between false VC and true VC is called ventricle. → Laryngocele swelling not appear in indirect laryngoscopy

3-Ary-epiglottic folds:
Attached anterior to epiglottis and posterior to arytenoid.



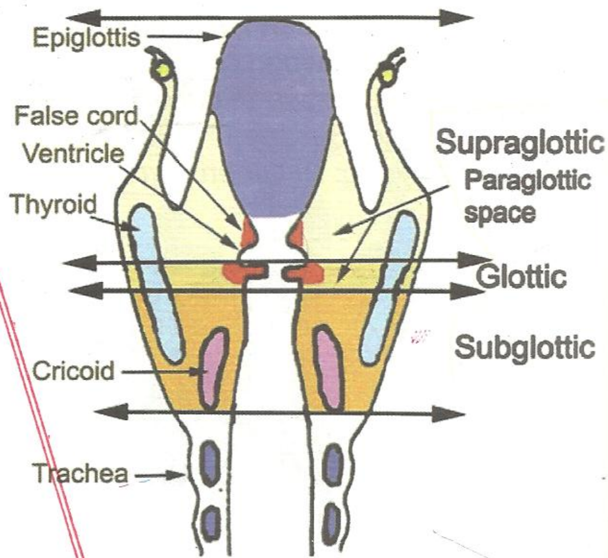
Laryngeal inlet by indirect laryngoscopy

Laryngeal inlet:
Boundaries:
Anterior → Epiglottis.
Posterior → Arytenoids.
Laterally → Ary-Epiglottic folds.

The Laryngeal Cavity:

It is devided into 3 regions

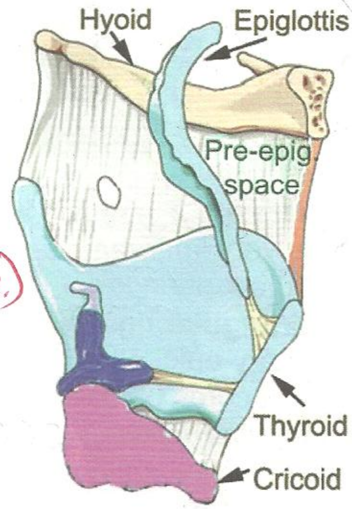
1- Glottic area: at the level of VC.
2- Supraglottic area: above the level the VC.
3- Subglottic area: below the level of the VC.



Spaces related to the larynx:

1- Pre-epiglottic space:
Infront of epiglottis
Boundaries:
Anterior: Thyro-hyoid membrane.
Posterior: Epiglottis.
Superior : Hyo-epiglottic ligament.

2- Paraglottic space:
Present to the side of the glottis
Boundaries:
Medially: False and True VC.
Laterally: Thyroid cartilage.
N.B.: Once carcinoma reach to the paraglottic Space → VC Fixation. → Transglottic Carcinoma



The Laryngeal mucosa:

Respiratory epithelium, except the V.C which are covered by deeply adherent non-kertinized stratified squamous epithelium. (Vocal Cord non k.s.s.e.)

The Laryngeal muscles: See VC paralysis.

Nerve supply: See VC paralysis.

Blood Supply:

-Superior laryngeal artery (from superior thyroid artery)
-Inferior Laryngeal artery (from inferior thyroid artery)

Lymphatic drainage:

Supraglottic area → Upper deep cervical LNs
Subglottic area → Lower deep cervical LNs. → *Laryngoscleroma in subglottic area
Glottic area (VC) → No lymphatic drainge (= good prognosis in cancer larynx).

Physiology

The larynx has 4 Functions:

1-Protective Function:

a) Reflex closure during swallowing by 3 tires mechanism:
- Aryepiglottic fold.
- False V.C.
- True V.C.

b) Reflex elevation of the larynx during swallowing.
c) Reflex inhibition of respiration during swallowing.
d) Reflex cough: if any FB enter the larynx.

2-Respiratory Function:

The VC become fully abducted during inspiration.

3-Phonatory Function:

The VC become adducted during phonation (occur during expiration).

4-Fixation of Chest:

The VC become adducted to increase intra-thoracic pressure during lifting heavy weights, labour and daefecation.

Laryngeal symptoms

Hoarseness:

Rough quality of low pitched voice due to one or more of 3 factors
- Factors imparing the VC tension.
- Factors imparing the VC vibration.
- Factors imparing the VC adduction

} VC affection

Stridor:

Difficulty noisy breathing due to partial upper airway obstruction.
It may be:
Inspiratory → during inspiration (in glottic and supraglottic obstruction).
Expiratory → during expiration (in bronchial obstruction).
Biphasic → during inspiration and expiration (in subglottic and tracheal obstruction).

Methods of laryngeal examination: See Clinical ENT

Indirect laryngoscopy: veiwing the larynx through laryngeal mirror
Flexible laryngoscopy: veiwing the larynx through flexible fibroptic tube introduced through the nose under local anaesthesia.
Direct laryngoscopy: veiwing the larynx through rigid wide tube introduced through the mouth under general anaesthesia.
Microlaryngoscopy: veiwing the larynx by direct laryngoscopy with the use of microscope to magnify the veiw.
Microlaryngosurgery (MLS): surgery by microlaryngoscopy.
Stroposcopy: veiwing the vocal cords by flexible laryngoscopy with intermittent flashes of light coincding with vocal cord vibration to see the mucosal waves.

Congenital Diseases

Congenital web

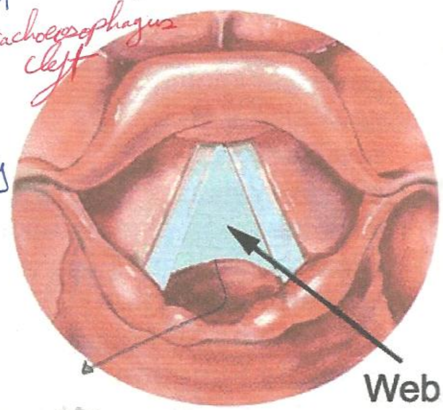
Def.: Fibrous band between both VC anteriorly.

Clinical picture:

Symptoms:

-Small web: Asymptomatic

-Large web: weak hoarse cry.
stridor (inspiratory).



Signs:

Flexible laryngoscopy or direct laryngoscopy to see the web which is grayish white in colour (fibrous), at anterior part between both VC, with sharp crescenteric posterior border.

Treatment:

- Small web:

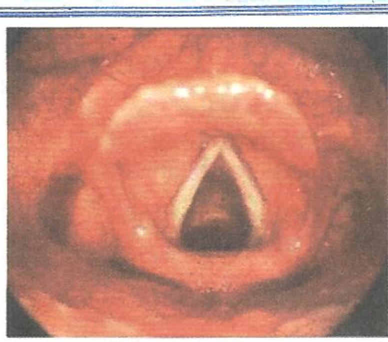
No treatment but avoid upper respiratory infection.

- Large web:

Tracheostomy in severe stridor.

Excision of web by Microlaryngosurgery (MLS) either by Laser or conventional.

Laryngomalacia (Congenital laryngeal stridor)



Normal



Laryngomalacia

Def.: Abnormal softening of the larynx that collapse during inspiration.

Pathology (Causes of obstruction):

1- Abnormal softening of laryngeal cartilage.
2- Omega-shaped epiglottis
3- Exaggerated infantile larynx (narrow subglottis).
4- Redundant ary-epiglottic fold.

Clinical picture:

Symptoms:

-Stridor: Inspiratory only, increased by upper respiratory infection.

-Hoarseness: absent as No VC affection.

Signs:

Flexible laryngoscopy or direct laryngoscopy show collapse of larynx during inspiration and become normal during expiration.

Treatment:

No treatment as the condition improves spontaneously by the age of 18-24 months, but avoid upper respiratory infection.

-Tracheostomy: in severe stridor, with excision of redundant mucosa by Laser (MLS).

3 Congenital subglottic stenosis

Def.: Narrowing of subglottic area.

Clinical picture:

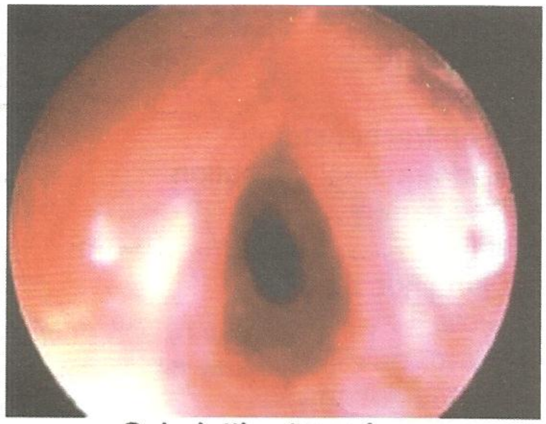
Symptoms:

- Stridor (Biphasic).
- Hoarseness → Absent.

Signs: Flexible laryngoscopy or direct laryngoscopy shows the stenosis.

Treatment:

- Tracheostomy in severe stridor.
- MLS and removal of stenosis by Laser or laryngofissure.



Subglottic stenosis

4 Subglottic Haemangioma

Clinical picture:

Symptoms:

- Stridor (Biphasic).
- Hoarseness (Absent).

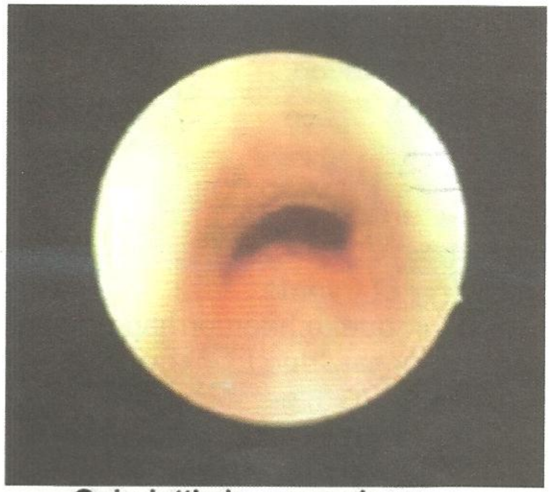
Signs: Flexible laryngoscopy or direct laryngoscopy shows purple subglottic mass

Treatment:

-No treatment as the condtion improves spontaneously.

-Tracheostomy: if severe stridor.

-MLS and Laser excision; in severe symptoms.



Subglottic haemangioma

5 Laryngo-tracheo-oesophageal cleft

Lead to hoarseness, stridor and aspiration → chest infection.

6 Vocal cord paralysis

-It may be unilateral or bilateral.

-It may be due to birth trauma (Brain injuries).

7 Congenital cyst

Def.: Cyst at the ary-epiglottic fold.

Clinical picture:

Symptoms:

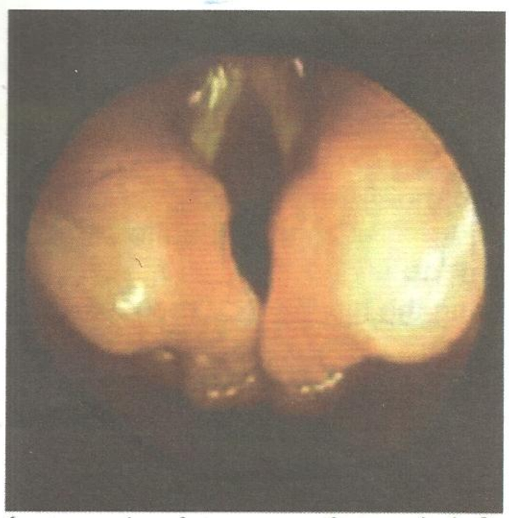
- Stridor (Inspiratory)
- Hoarseness (Absent).

Signs: Flexible laryngoscopy or direct laryngoscopy shows the cyst.

Treatment:

-Tracheostomy: if severe stridor.

-MLS and excision by Laser or conventional.



Laryngotracheo-oesophageal cleft

" قوتي في الضعف تكمل "

Laryngeal Trauma

Types of Trauma:

1- Mechanical:

a) Surgical:

High tracheostomy
Endotracheal intubation
Endoscopy

b) Accidental:

Gun shot, stab.
Blow
Car accident.
Strangulation.
FB



2- Physical:

- Radiotherapy (Irradiation perichondritis).
- Hot steam inhalation.

3- Chemical:

- Corrosive.
- Irritant gases.

Clinical picture:

- **Symptoms:**

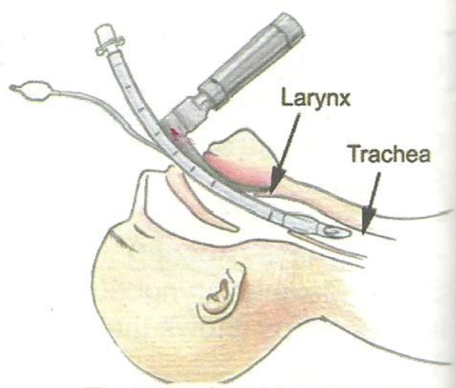
1. History of trauma.
2. Stridor: due to haemorrhage, haematoma or oedema in the larynx. → tracheostomy
3. Hoarseness: due to injury of V.C.
4. pain: referred to the ear.
5. Dysphagia: caused by pain.
6. Haemorrhage: if external wound. → Antibiotic
7. Neck swelling: oedema, Haematoma or surgical emphysema. → Steroids
8. Shock: either neurogenic (pain) or hypovalaemic (haemorrhage). → transfusion

- Signs:

- General: Shock.
- Local:

Inspection: - Swelling.
- Blunting of thyroid angle.

Palpation: - Tenderness
- Crepitus (due to surgical emphysema).



Endotracheal intubation

Treatment:

1- Saving the airway by: Tracheostomy or Endotracheal intubation.
2- Saving the blood volume (shock).
3- Systemic antibiotics to prevent infection.
4- Steroid to decrease oedema.
5- Management of the pathology:

a) Ligation of bleeding vessels.
b) Reduction of fractured cartilage.

WhiteKnightLove

Foreign body inhalation (in the airway)

Type of patient: more common in children.

Type of FB:

1) Exogenous FB:
   - Vegetable → as water melon seeds, beans.
   - Non-vegetable → as pins and beads.

2) Endogenous FB:
   Vomitus or blood.

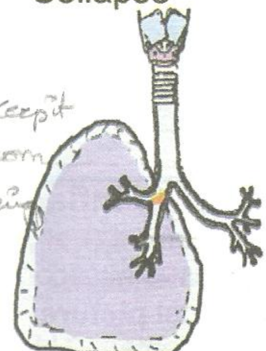


Collapse

Site of impaction:
An inhaled FB is rarely impacted in the Larynx giving rise to severe stridor. It usually passes to the right bronchus (as it is wider and more in line with the trachea).

Clinical picture: 3 stages

1- Initial Stage:
A history of Attacks of coughing, chocking, dyspnea and cyanosis in a young child is suspicious of FB inhalation.



Emphysema

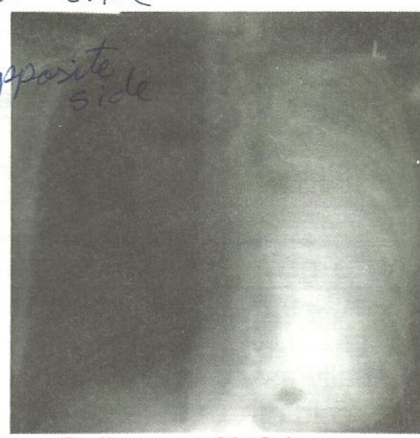
2- Latent Stage:
Period with no symptoms, a vegetable FB soon causes acute vegetal bronchitis as an allergic reaction to the vegetable oil, while metallic FB may remain latent for longer period.

3- Manifest Stage:
FB in Rt. Bronchus Causing
a. Complete obstruction.
Or
b. Partial valvular obstruction.

The patient presented with dyspnea +

a) Complete obstruction lead to lung collapse:
- Dullness on percussion.
- Shift of mediastinum to same side.
- No air entery on auscultation.

b) Partial valvular obstruction lead to emphysema.
- Hyper-resonance on percussion.
- Shift of mediastinum to opposite side.
- Diminshed air entery on auscultation.



Collapse of left lung

Investigations:

- X-ray may show → Radio-opaque FB. / Collapse. / Emphysema.
- Bronchoscopy: is diagnostic to see the FB.

Treatment:
Removal by Bronchoscopy under special technique of anaesthesia.

N.B. Heimlich maneuver: sudden compression of the upper abdomen and xiphisternum is done in the initial stage of FB inhalation to extrude it.



Heimlich manoeuvre

Laryngeal Inflammations

Acute:
- Specific: Diphtheria.
- Non specific: Laryngitis
  - Epiglottitis.
  - Laryngo tracheobronchitis.

Chronic:
- Specific (granuloma):
  - Scleroma
  - Syphilis
  - T.B.
  - Leprosy
  - Fungal
- Non specific: Atropic
  - Hypertrophic:
    - Diffuse
    - Localized:
      - Nodes
      - Polyp
      - Leukoplakia

I) Acute Inflammations:

1. Specific (Laryngeal Diphtheria):

It is usually secondary to pharyngeal (faucial) diphtheria.

Clinical picture:

Symptoms:
- Hoarseness
- Stridor.

Signs: Dirty grayish membrane over the laryngeal inlet.

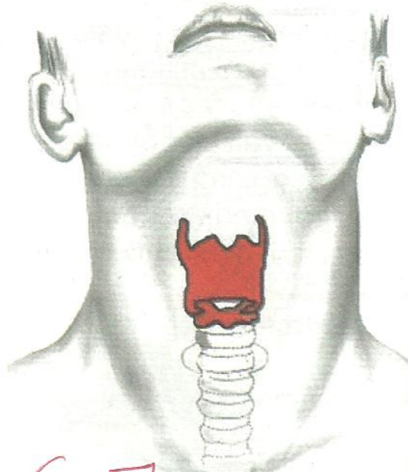
Investigations: as faucial diphtheria.

Treatment:

1- **S**aving the airway by tracheostomy or endotracheal intubation in severe stridor.
2- **A**ntitoxic serum.
3- **S**ystemic antibiotics.

2. Non Specific:

A) Acute non specific laryngitis:



Def.: Acute inflammation of laryngeal mucosa.

Causes:

- It is usually associated with upper respiratory infection (as common cold or exanthemata)
- Organisms: Starts by viral then 2ry bacterial infection.
- Predisposing factors:

Local: Abuse of voice and smoking.

General: Low general resistance and pollution.

Clinical picture:

Symptoms:

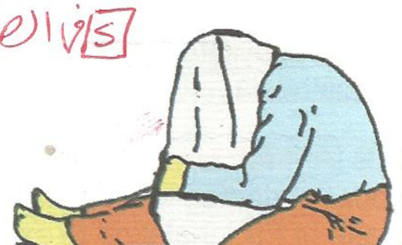
General: Constitutional symptoms.

Local: Hoarseness (is the main symptoms in adults).
Stridor (is the main symptom in children).

Signs: Diffuse congestion and oedema of VC and laryngeal mucosa especially subglottic area in children.

Treatment:

- General: Complete bed rest + plenty of warm fluids.
  Systemic antibiotics + Analgesics.
- Local: Complete voice rest.
  Steam inhalation with Tincture benzoine.



Steam inhalation

N.B.:Acute non specific Laryngitis In children:

It is more dangerous than in adults (causing stridor in children) due to:

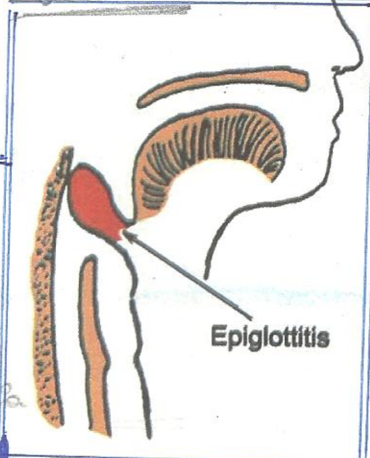
1-The larynx is small (easy obstruction).
2-The submucosa is loose (easy oedema).
3-The larynx is funnel-shaped with very narrow subglottic area (easy obstruction)
4-The laryngeal cartilages are softer (easy collapse).

It is the commonest cause of stridor in children.

Treatment: Hospitalization +

1. **S**ystemic antibiotics by injection.
2. **S**teroids: to decrease oedema.
3. **S**upplying oxygen inhalation.
4. **S**team inhalation with tincture benzoine.
5. **S**aving the airway by endotracheal intubation, or tracheostomy in severe stridor.

B) Acute Epiglottitis (Supraglottitis):



Def.: Inflammation of the mucosa of the epiglottis.

Causes:

- It is usually associated with upper respiratory infection.
- Organism: Haemophilus Influenza.
- More in children.

Clinical picture:

Symptoms:

General: Constitutional symptoms.

Local: - Hoarseness: Hot potato (Muffled) voice.
- Stridor: inspiratory.
- Dysphagia and odynophagia.

Signs: Severely congested and oedematous epiglottis.

Treatment: The same as acute non specific laryngitis in children.

C) Acute Laryngotracheobronchitis:

Def.: Acute inflammation of laryngeal and lower respiratory mucosa.

Causes:

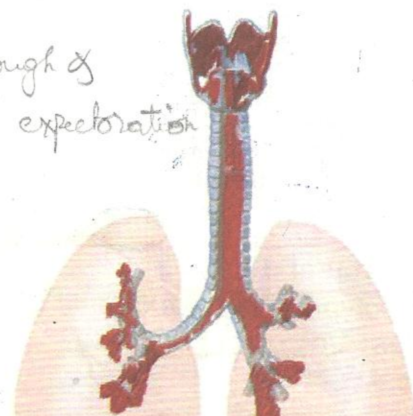
- It is usually associated with upper respiratory tract infection.
- Organism: usually Viral
- More in children.

Clinical picture:

Symptoms:

General: Contitutional symptoms.

Local: - Stridor.
- Hoarseness.
- Cough and expectoration.



Acute laryngotracheobronchitis

Signs: Subglottic oedema and congested laryngeal mucosa.

Treatment: The same as acute non specific laryngitis in children.

II) Chronic Inflammations:

Non Specific Inflammations:

1- Chronic Atrophic laryngitis:

-It is usually associated with atrophic rhinitis.
-The laryngeal mucosa is pale, dry and covered with crusts.

Clinical picture: Hoarseness.
Stridor.

Treatment: Potassium iodide.
Direct laryngoscopy to remove the crusts.



Atrophic laryngitis

2- Chronic diffuse hypertrophic laryngitis:

Def.: Chronic diffuse inflammation with hypertrophy of laryngeal mucosa.

Causes: - Repeated acute attacks.
- Persistence of the predisposing factors.

Clinical picture:

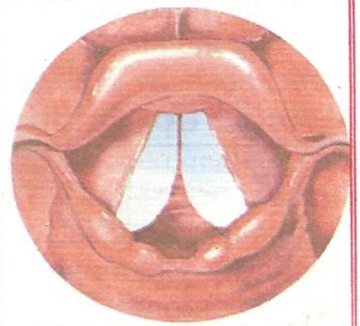
Symptoms: Hoarseness.
Irritative cough.

Signs: Bilateral diffuse symmetrical thickening and congestion of VC seen by indirect laryngoscopy.

Treatment:

1. Avoid the predisposing factors.
2. **S**team inhalation with tincture benzoine.
3. Microlaryngosurgery with stripping of VC (either conventional or laser) followed by speech therapy.

N.B. Reinke's oedema: is oedema of the subepethelial space of the VC.



Hypertrophic laryngitis

3- Chronic Localised hypertrophic Laryngitis:

A) Vocal cord nodules (singer's nodes):

Def.: Localized area of VC hyperplasia.

Causes:

Voice abuse → Subepithelial hematoma → Organization.

Clinical Picture:

Symptoms: Hoarseness.

Signs: Bilateral small nodules at the junction between anterior $^1/_3$ and posterior $^2/_3$.

Treatment:

1. Complete voice rest.
2. Speech therapy: if the nodules are small.
3. Microlaryngosurgery with removal of the nodules either by laser or conventional followed by speech therapy.



Vocal cord nodules

B) Laryngeal polyp:

Def.: Polypoid mucosa on the VC.

Causes: Voice abuse.

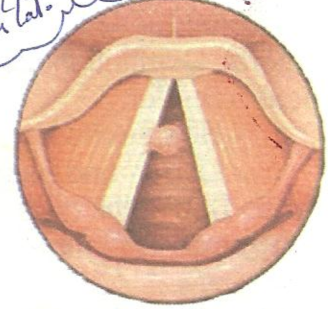
Clinical picture:

Symptoms: Hoarseness

Signs: Sessile or pedunculated unilateral polyp which may be greyish (oedematous polyp), reddish (vascular polyp) or whitish (fibrotic polyp).

Treatment:

1. Complete voice rest.
2. Microlaryngosurgery with removal of the polyp either by laser or conventional followed by speech therapy.



Vocal cord polyp

C) Leukoplakia:

- Grossly: Raised white patch above the surface epithelium.

- Microscopically: Hyperplasia, hyperkeratosis, and acanthosis, but the basement membrane is intact.
- It is a precancerous lesion.

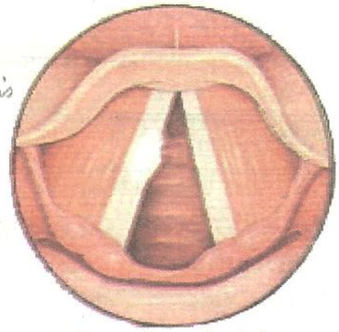
Clinical picture:

Symptoms: Hoarseness.

Signs: As gross picture.

Treatment:

Microlaryngosurgery with removal of the lesion either by laser or conventional followed by carful follow-up.



Leukoplakia

Specific Inflammations (Granuloma):

Granuloma of Larynx

Definition: Chronic specific inflammation characterized by formation of macrophages.

(1) Laryngoscleroma:

- Caused by klebsiella rhinoscleromatis.
- It is usually 2ry to rhinoscleroma.
- It is the commonest ENT granuloma in Egypt.

Site: Subglottic area,it starts as bilateral nodules then masses then web.

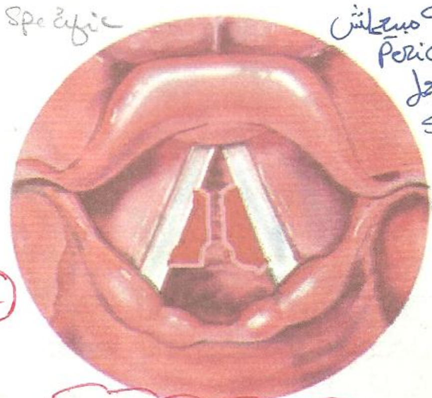
Symptoms:

Biphasic stridor.

Hoarseness of voice (is not marked).

Crusty expectoration.

Signs: Indirect laryngoscopy shows subglottic masses or web.



Subglottic masses

Investigations:

- X-ray: narrow air column.
- CT: to show site, degree and length of stenosis.
- Direct laryngoscopy and biopsy: Russel bodies and Mikulicz cells in active stage.

Treatment:

1- Medical treatment:

- Rifampicin: 600mg/day (side effects= hepatotoxic and red discolouration of urine).
- Streptomycin:1gm/day for 40 days (side effects= ototoxic + nephrotoxic).

2- Surgical:

(a) Tracheostomy (low): in severe stridor.

(b) Microlaryngosurgery and excision of the web by laser.

(c) Laryngofissure with removal of web and covering the raw area by skin graft.

(2) T.B. Laryngitis:

- Caused by mycobacterium T.B.
- Usually associated with pulmonary T.B.

Site: posterior part of larynx (interarytenoid).

Symptoms:

Hoarseness of voice.

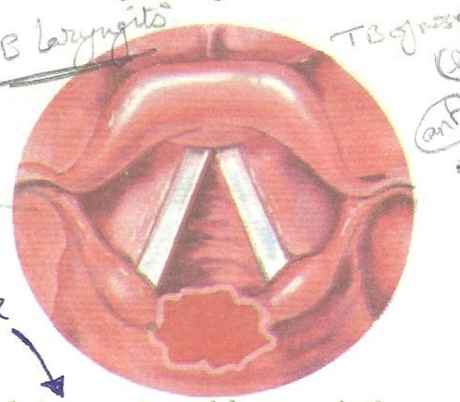
Stridor.

Pain referred to the ear.

Cough, hemoptysis due to pulmonary T.B.

T.B. toxaemia: . Night fever and night sweating.
. Loss of weight and loss of appetite.

Signs: Indirect laryngoscopy show T.B. granulations in posterior part of larynx.



Inter-arytenoid granulations

Complications: Perichondritis → necrosis of cartilage → laryngeal stenosis.

Treatment:

1. Tracheostomy in severe stridor.
2. Antituberculous: Rifampicin - Isoniazid.

(3) Syphilis:

- Caused by treponema pallidum.

Site: Gumma affects anterior part of larynx.

Symptoms:

Hoarseness of voice.

Stridor.

No pain.

Signs: Indirect laryngoscopy shows syphilitic granulations in anterior part of larynx.

Complications: Laryngeal stenosis (as T.B.).

Treatment:

1. Tracheostomy: in severe stridor.
2. Antisyphilitic: penicillin.



Gumma (syphilis)

(4) Leprosy:

- Caused by mycobacterium leprae.

Site: anterior part of larynx.

(5) Fungal infections:

Occur in patients with low immunity as in diabetics, prolonged antibiotic therapy or AIDS.

A. Moniliasis:

- Caused by candida albicans.
- Usually associated with aerodigestive moniliasis.
- Characterized by milky whitish membrane.
- Treatment: antifungal as nystatin.

B. Aspergillosis.

C. Actinomycosis.

Perichondritis of the larynx

- Def.: Inflammation of the perichondrium of the laryngeal cartilage.

Causes:
1- Traumatic: Mechanical, chemical or physical .
2- Inflammatory: T.B, Syphilis or leprosy.
3- Neoplastic: Cancer larynx invading laryngeal certilage.

Clinical picture:

Symptoms:
- General fever, headache and malaise.
- Local: Stridor.
  Hoarseness.
  Pain in the neck referred to the ear.
  Dysphagia.

Signs:
- Inspection: Broadening of larynx.
- Palpation: Tenderness.
- Indirect laryngoscopy: Congested oedematous laryngeal mucosa.

Complications: Necrosis of the cartilage and stenosis (due to fibrosis).

Treatment:

Medical: Systemic parenteral antibiotics + Analgesic antipyretics.

Surgical:
- Tracheostomy: if there is severe stridor.
- Incision and drainage of pus with removal of necrosed cartilage
- Laryngectomy: if there is extensive necrosis.

Tumours of the larynx

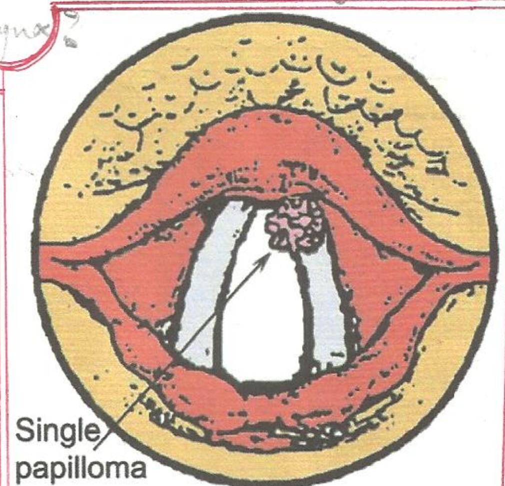
	Benign	Malignant
Epithelial	Papilloma (+) Adenoma	Squamous cell Ca (+++) Adenocarcinoma
Mesenchymal	Haemangioma Chondroma	Angiosarcoma Chondrosarcoma

Benign tumours

Papilloma:

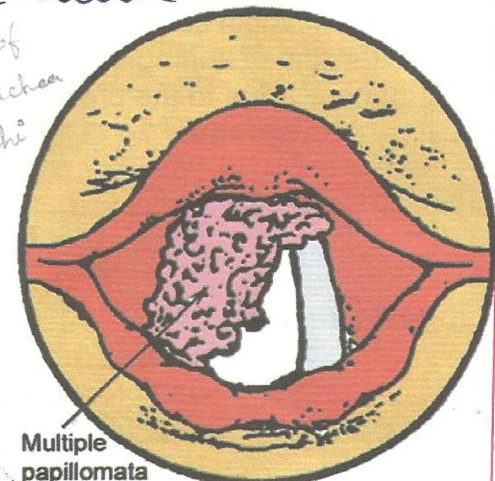
Types: -Single (adults)
-Multiple (juvenile)

1-Single papilloma:



Age: Adults
Sex: more in Males
Pathology:
Gross picture: arises at VC, whitish, warty, sessile or pedunculated.
Microscopic picture: Papilloma = vascular connective tissue core covered by hyperplastic St. Sq. epithelium
Clinical picture:
Symptoms: Hoarseness.
Stridor is rare (if large).
Signs: as gross picture seen by indirect laryngoscopy.
Treatment: Microlaryngosurgery and removal either conventional or by Laser

2-Multiple papillomatosis:



-Synonym: Juvenile multiple papillomatosis or recurrent respiratory papillomatosis
Age: Children
Sex: more in Males.
Causes: Unknown but may be:
1-Autoimmune
2-Viral (Human Papilloma Virus)
3-Hormonal disturbance (Estrogen deficiency)
Pathology:
Gross picture: multiple warty growths, sessile, affecting any part of larynx even trachea and bronchi, and around the tracheostomy opening.
Microscopic picture: papilloma but multiple.
Clinical picture:
Symptoms: Stridor.
Hoarseness.
Signs: as gross picture seen by indirect laryngoscopy or flexible laryngoscopy (child)
Treatment:
1-Tracheostomy: if there is severe stridor.
2-Microlaryngosurgery: removal either conventional or laser (better)
3-Interferon (antiviral)
4-Estrogen (hormonal)

Prognosis of papilloma:
- Single (malignant transformation = 5%)
- Multiple (recurrent, but spontaneous regression at puberty).

Cancer Larynx

Incidence: 1% of all cancers diagnosed annually
35% of all head and neck cancers
Age: old (above 40 yeas).
Sex: more common in males (M : F = 8:1)



Predisposing factors:
1- Smoking: Nitrocarbon is carcinogenic.
2- Alcohol: predispose to supraglottic carcinoma.
3- Smoking and alcohol have synergistic effect.
4- Irradiation.

Precancerous lesions:
1- **S**ingle papilloma of adults.
2- **L**eukoplakia.
3- Laryngeal **K**eratosis.

Pathology:

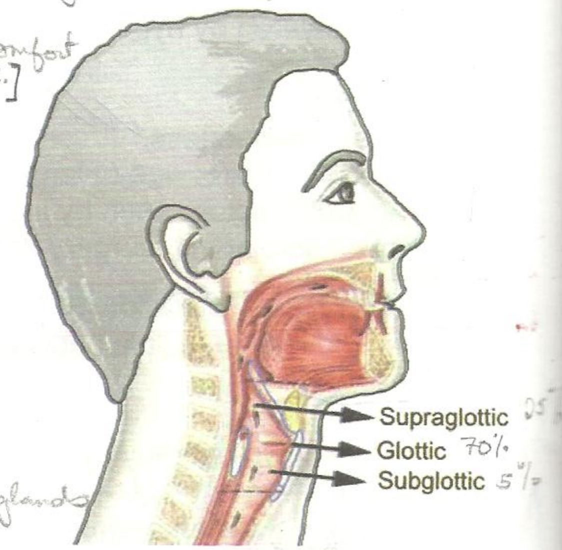
-Gross Picture:
Shape: Ulcer, cauliflower or nodular infiltrative
Sites: - Glottic: 70%
- Supraglottic: 25%
- Subglottic: 5%

N.B.: Transglottic carcinoma = reaching to paraglottic space.

-Microscopic picture: Sq. cell carcinoma in 98% of cases

-Spread: local, lymphatic or blood

A-Local spread: to the surrounding structures.
N.B.: Extension of glottic Ca. to anterior commissure has bad prognosis. (anterior commissure =anterior attachment of vocal cord to thyroid cartilage).
N.B.: Extension of supraglottic Ca. to epiglottis has bad prognosis (due to the presence of pits).



B-Lymphatic spread:

Supraglottic:
- To upper deep cervical LNs.
- High incidence (30%)
- One of silent areas (occult 1ry)

Subglottic:
- To lower deep cervical LNs then paratracheal and superior mediastinal LNs.
- Bad prognosis

Glottic area has no lymphatic drainage (good prognosis)

Transglottic:
- High incidence (20%)
- Bad prognosis

C-Blood spread: BBLL (Lung, Liver, Bone and Brain)

-Prognosis:
-Glottic carcinoma: good prognosis due to early symptoms (hoarseness) and no lymphatic metastasis.
-Subglottic: bad prognosis due to paratracheal and superior mediastinal LNs spread.

Clinical picture

Symptoms:

1-Hoarseness of voice:
Early in glottic carcinoma

Old male with progressive or persistent hoarseness for more than 2 weeks should be examined carefully to exclude cancer larynx especially if he is smoker.

2- Stridor:
Early in subglottic carcinoma

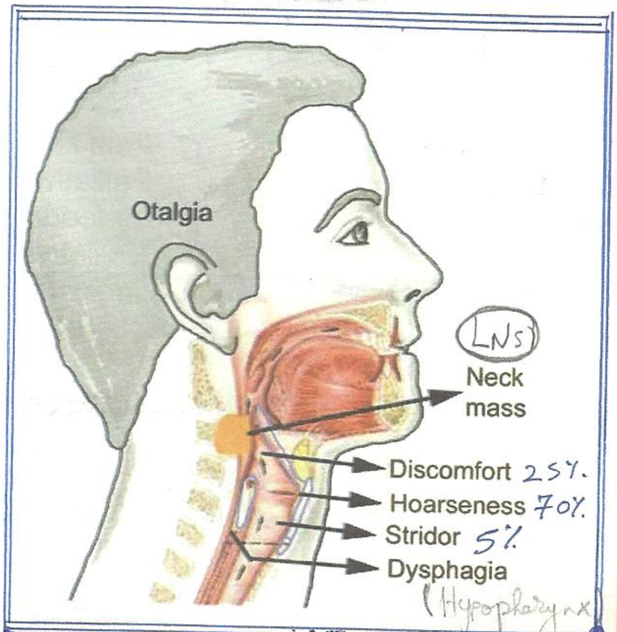
3-Discomfort sensation in the throat:
Early in supraglottic carcinoma

4- Referred otalgia: through Arnold's branch of vagus.

5-Dysphagia: if extends to the hypopharynx (i.e. Local spread)

6-Symptoms of LNs metastasis: Neck swelling (i.e. Lymphatic spread)

7-Symptoms of (Blood spread)
Lung: cough, hemoptysis, chest pain
Liver: abdominal pain, jaundice, ascitis.
Bone: bony aches, pathological fracture.
Brain: ↑ ICT



Signs:

A) Local examination:

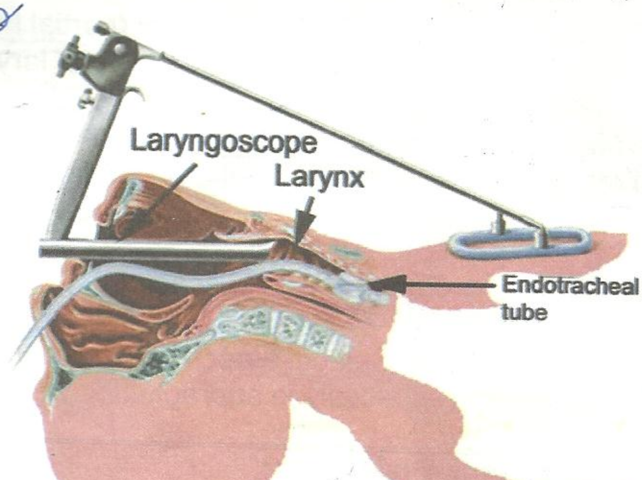
Larynx: Indirect laryngoscopy (I.L.)
To detect site, size, shape, extension of the tumour, mobility of VC and airway shink.

Neck: to exclude lymph node metastasis.

B) General examination:
To exclude distant metastasis especially chest

Investigations:

- Direct Laryngoscopy (D.L.) and biopsy.
- CT: to see site, size, extension of tumour and to detect LNs metastasis if not palpable.
-Metastatic work up:
  - Lung: Chest X-ray
  - Liver: ultrasonography
  - Bone: Bone scan
-Routine pre-operative investigations



Direct laryngoscopy

TNM classification

T: Primary Tumour
N: Lymph Node
M: Distant Metastasis

T:
- **Tis:** Carcinoma in situ
- **T_1:** Tumour limited to one area (supra-, sub-, or glottic) with mobile vocal cords.
- **T_2:** Tumour extended to more than one area with mobile vocal cords.
- **T_3:** Tumour limited to the larynx with fixed vocal cords.
- **T_4:** Tumour extended to the laryngeal cartilage and/or extra laryngeal spread.

N:
- **No:** no palpable lymph nodes.
- **N_1:** Single, Ipsilateral, 3 cm or less in diameter.
- **N_2:** a: Single, Ipsilateral, 3-6 cm in diameter.

b: Multiple, Ipsilateral, non more than 6 cm in diameter.

c: Contralateral or bilateral, non more than 6 cm in diameter.

N_3: Node (s) more than 6 cm.

M: **Mo:** no distant metastasis.

M_1: There is distant metastasis.

Treatment:

1. **Curative treatment**
   - Surgery
   - Radiotherapy
   - Combined (both)

2. **Palliative treatment**
   - Pain killers (analgesics)
   - Palliative surgery as tracheostomy for stridor, gastrostomy for feeding
   - Palliative radiotherapy and chemotherapy

N.B.: palliative treatment is indicated in cases of extensive cancer larynx fixed to vertebral column or with distant metastasis.

Curative treatment: For 1ry tumour and for lymph nodes if palpable.

*** For 1ry tumour**

Glottic
- **Tis:** either Surgery (microlaryngosurgery with conventional removal or laser) or Radiotherapy but surgery is better
- **T1:** either Surgery (laser excision or laryngofissure and cordectomy) or Radiotherapy (voice is better)
- **T2:** either Surgery (partial laryngectomy) or Radiotherapy
- **T3, T4:** Surgery (total laryngectomy) and Radiotherapy

Supraglottic
- **T1, T2:** Surgery (partial laryngectomy) or Radiotherapy
- **T3, T4:** Surgery (total laryngectomy) and Radiotherapy

Subglottic → Surgery (total laryngectomy) and Radiotherapy.

Transglottic → Surgery (total laryngectomy) and Radiotherapy.

***For Lymph Nodes (LNs):**

If palpable → Radical Neck Dissection (RND).

If not palpable → Selective neck dissection or radiotherapy (especially in supraglottic carcinoma).

Radical Neck Dissection:

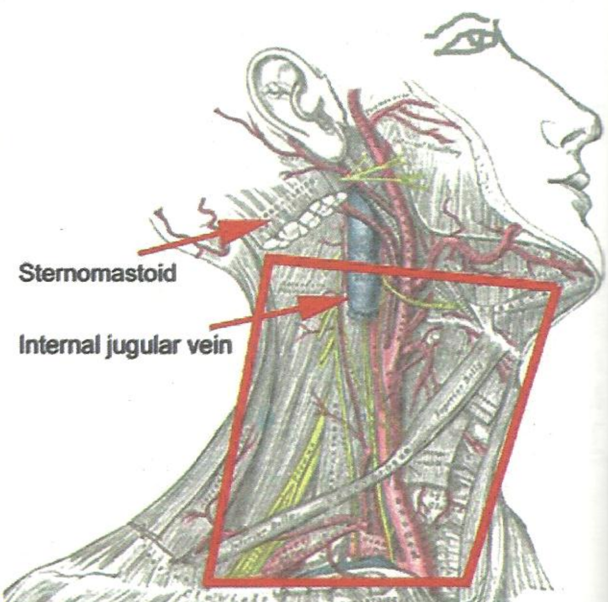
Removal of all lymphoid tissues from the mandible above to the clavicle below and from midline anterior to the anterior border of Trapezius posterior

+ Removal of 3 structures:

1- Sternomastoid muscle.

2- Internal Jugular Vein.

3- Accessory nerve.



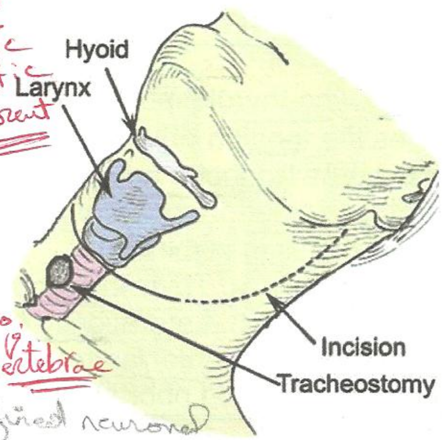
Radical neck dissection

Total laryngectomy:

Def.: Removal of the whole larynx.

Indications:

1- T_3 and T_4 glottic and supraglottic carcinoma.
2- All subglottic and transglottic carcinoma.
3- Recurrence after partial laryngectomy.
4- Recurrence after radiotherapy.

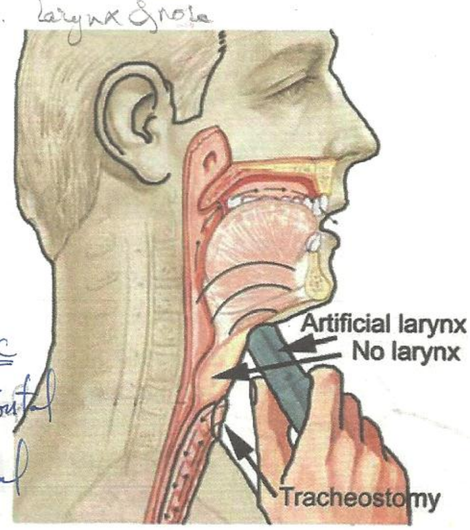


Contraindications:

1- Refusal by the patient.
2- Extensive tumour fixed to important structure as vertebral column or with distant metastasis

Disadvantages:

1- Loss of laryngeal function:
a) Respiratory: Permanent tracheostomy.
b) Protective function: inability to swim.
c) Phonation.
d) Fixation of chest: inability to do heavy manual work.
2- Loss of nasal function: as smell and humidification.



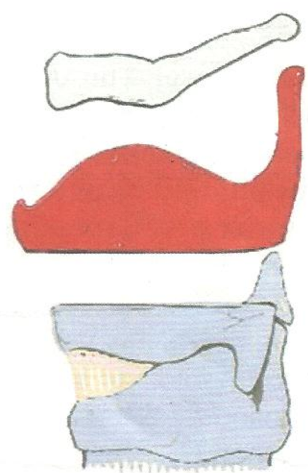
Rehabilitation of voice after total laryngectomy:

1-Oesophageal speech
2-Artificial larynx
3-Speaking valve

Partial laryngectomy:

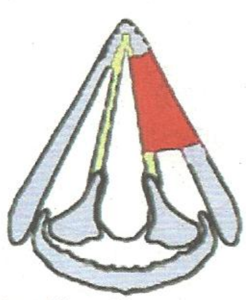
Types:

1- Horizontal hemilaryngectomy:
In supraglottic Ca not reaching to VC.

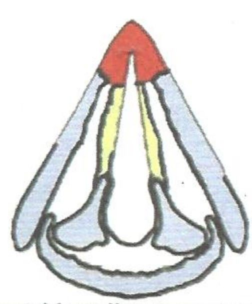


Horizontal hemilaryngectomy

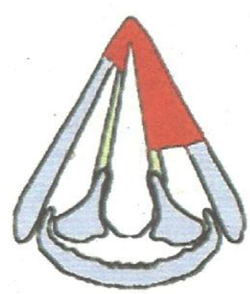
2- Vertical hemilaryngectomy:
In Glottic Ca with mobile vocal cords (T_2).
a) Lateral vertical hemilaryngectomy: In Ca limited to middle part VC.
b) Frontal vertical hemilaryngectomy: In Ca limited to anterior commissure.
c) Frontolateral vertical hemilaryngectomy: In Ca in VC reaching to anterior commissure.



Lateral hemilaryngectomy



Frontal hemilaryngectomy



Fronto-lateral hemilaryngectoy

Vocal Cord Paralysis

Muscles of the Larynx:

1- Tensor: Crico-thyroid muscle

It increases the tension of VC → higher pitch.

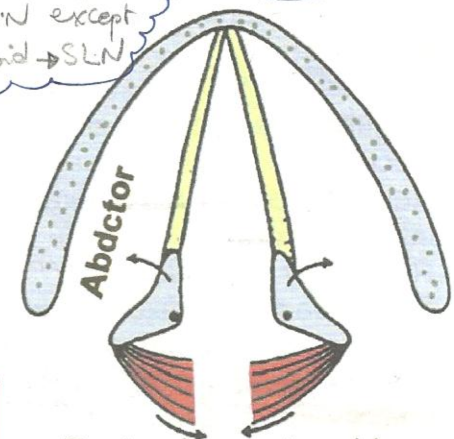
It has also some adductor action.

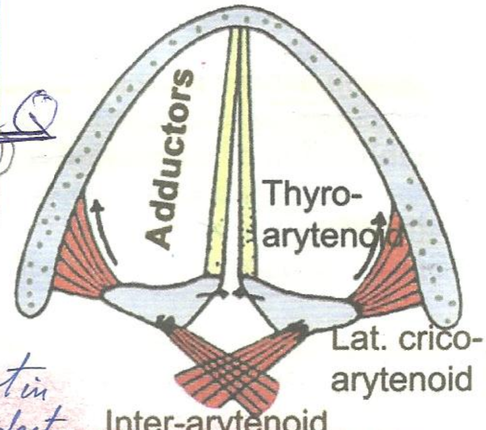
2- Abductor: Posterior crico-arytenoid

It opens the glottis in inspiration.

3- Adductors: a. Thyro-arytenoid.
b. Lateral crico-arytenoid.
c. Inter-arytenoid.

They close the glottis in phonation.





Nerve Supply:

Vagus nerve: → a. Superior Laryngeal nerve.
→ b. Recurrent laryngeal nerve.

a. Superior laryngeal nerve (SLN):

-Motor to cricothyroid muscle (via External branch).

-Sensory to mucosa above VC (Via Internal branch).

b. Recurrent laryngeal nerve (RLN):

-Motor to all laryngeal muscles except cricothyroid.

-Sensory to mucosa below VC.

N.B.: The Lt RLN has longer course than the Rt RLN, as the Lt enter the chest and turns around the Aortic arch while the Rt. dose not enter the chest and turns around the subclavian artery at the root of the neck. So the Lt one is more liable to be affected.

Positions of vocal cords:

1- Median: the VC is in midline position (Shink = 0).

2- Paramedian: The VC is in paramedian position (Shink = 4 mm).

3- Cadaveric: The VC is in intermediate position (Shink = 8 mm).

4- Abduction: The VC is in abduction position (Shink = 14 mm).

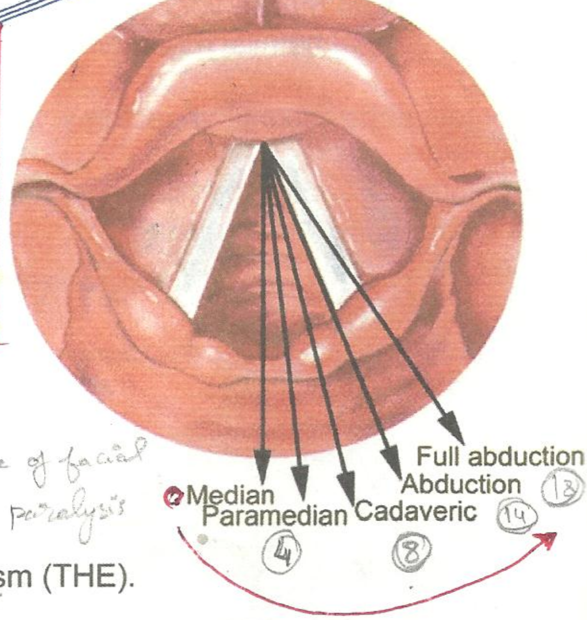
5- Full abduction: The VC is in full abduction position (Shink = 18 mm).

Explanation of positions:

Wagner and Grossman theory

Injury of vagus → Cadaveric position (All muscles are paralysed)

Injury of RLN → Paramedian position (as the crico-thyroid has some adductor action and it is supplied by SLN). However the small variations between both positions are due to fibrosis of paralysed muscles.



Causes of vocal cord paralysis:

1- Intracranial (i.e. central):

a. Traumatic: head trauma or car accident.

b. Inflammatory: meningitis or encephalitis.

c. Neoplastic: brain tumour.

d. Vascular: thrombosis, heamorrhage or embolism (THE).

e. Degenerative: multiple sclerosis (MS).

2- Cranial (i.e. skull base at jugular foramen):

a. Traumatic: Fracture base.

b. Inflammatory: Malignant otitis externa.
c. Neoplastic: Carcinoma of nasopharynx.

3- Extracranial:

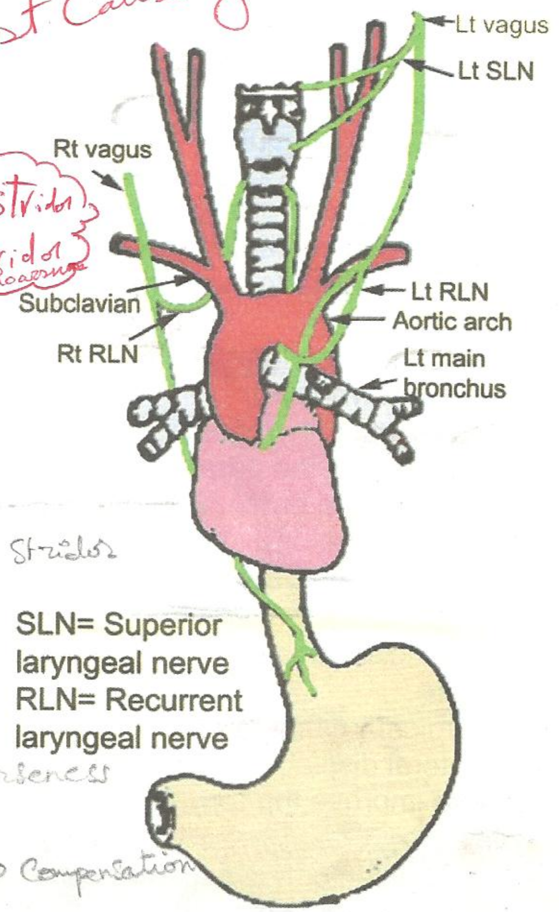
a. In the neck:

1- Thyroid operations (Rt. is more liable).
2- Cancer thyroid.
3- Malignant lymph nodes.
4- Neck injury.
5- Cancer oesophagus

b. In the chest (Lt. only):

1- Bronchogenic carcinoma.
2- Cardiothoracic operations.

4- Idiopathic: in 25% the cause is unknown but may be peripheral neuritis (virus or diabetes).



Clinical Picture:

- Symptoms:

- Unilateral paralysis:

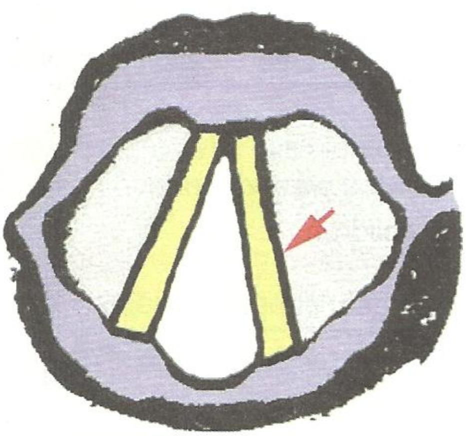
* Hoarseness: which improve spontaneously after 6-12 months as the healthy cord cross the midline to meet the paralysed cord (compensation).
* No stridor.

-Bilateral paralysis:

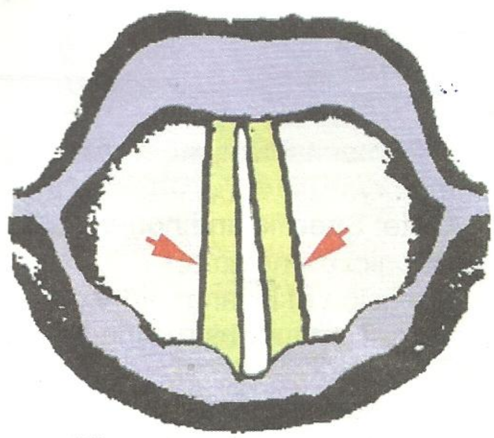
* Stridor: due to narrowing of the glottis by both immobile cords.
* The voice is relatively good (No hoarseness).

- Signs:

- Examination of the larynx by indirect laryngoscopy to detect the position of V.C
- Examination of the head, neck and chest to detect the cause of paralysis.



Left vocal cord paralysis; inspiration



Bilateral vocal cord paralysis

Investigations:

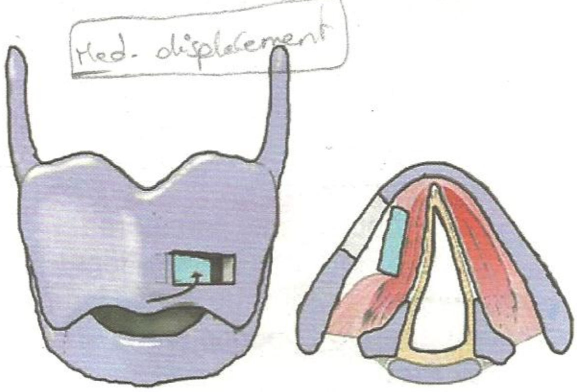
- CT: from the skull base to mid-thorax.
- Barium swallow: if cancer oesophagus was suspected.
- Thyroid scan: if cancer thyroid was suspected.
- Panendoscopy: All endoscopies (Naso-, laryngo-, Hypopharyngo-, oesophago, and bronchoscopy) and take biopsy from suspicious lesion.
- Stroboscopy: Intermittent flashes of light coinciding with VC movement to see the mucosal waves. This is done by the use of flexible laryngoscopy.

Treatment:

- Unilateral Paralysis:

1. Treatment of the cause (if present): as tumour e.g. Bronchogenic carcinoma.
2. No treatment as spontaneous compensation occurs within 6-12 months.
3. Surgical treatment:

Indications:
No compensations after 6-12 months.
Aim: Medial displacement of the paralysed cord to come in midline to meet the other cord.
Types:
a- Teflon injection lateral to the paralysed cord (not used nowadays).
b- Medialization thyroplasty (medial displacement of the paralysed cord by implant).
c- Reinnervation procedures which is called (Tucker's operation).

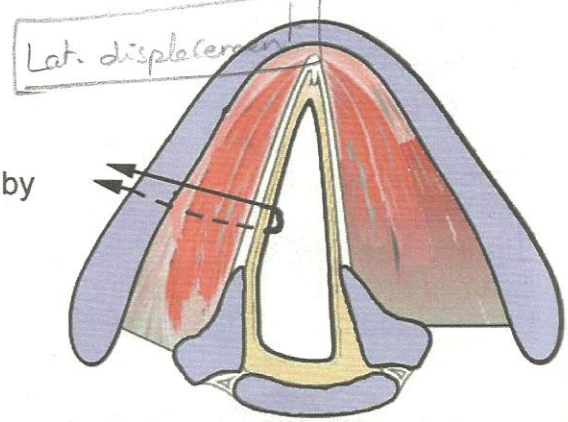


Medialization thyroplasty

II- Bilateral paralysis:

1. Tracheostomy: if there is severe stridor.
2. If detected at the end of thyroidectomy → re-exploration as the nerve may be taken in a ligature.
3. Surgical treatment:

Aim: lateral displacement of one of the paralysed cords to improve the airway.
Types:
a- Arytenoidectomy ± posterior cordectomy: (done by Laser microlaryngsurgery).
b- Woodman's operation: arytenoidectomy + cordopexy.
c- Lateralization thyroplasty.
d- Reinnervation procedures (Tucker's operation).



Lateralization thyroplasty

Laryngeal oedema

Causes:

1- Traumatic: mechanical,chemical and physical.
2- Inflammatory:
- Acute: Specific and non-specific especially in children.
- Chronic: granuloma.
- Extension of inflammatory oedema from pharyngeal suppurations.

3- Neoplastic: Tumour obstructing lymphatic drainage.
4- Miscellaneous:
- Angioneurotic oedema as allergy.
- Cardiac, Renal and Hepatic oedema (in failure).

Clinical picture:

Symptoms: Stridor.
Hoarseness.
Signs: Indirect laryngoscopy shows oedema of laryngeal mucosa.

Treatment:

- Medical: - Oxygen inhalation.
- Antioedematous drugs: as hydrocortisone: IV Injection.
- Surgical: Tracheostomy in severe stridor.

Laryngeal Stenosis

Def.: Narrowing of laryngeal lumen.

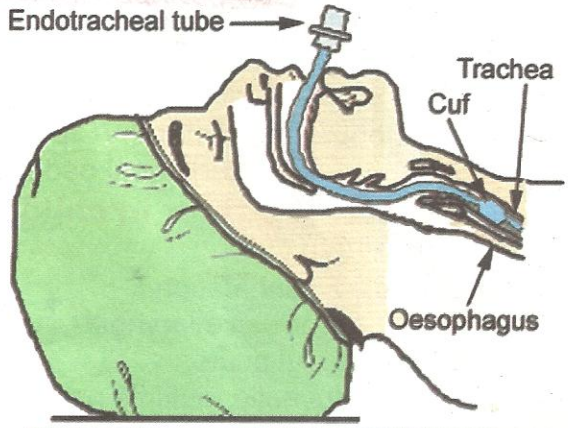
Causes:

A) Congenital: Failure of recanalization of the laryngeal lumen.
B) Traumatic: Mechanical-chemical-physical.
C) Inflammatory: All types of granuloma.
D) Neoplastic:
1- Carcinoma invading the cartilage.
2- Carcinoma treated by radiotherapy.

N.B.: The commonest causes of laryngeal stenosis are:
1- Prolonged cuffed endotracheal intubation is the most common cause.
2- Laryngoscleroma is the 2nd common cause.

Types of stenosis:

1. Supraglottic: rare.
2. Glottic.
3. Subglottic: the most common.



Clinical picture: (of subglottic stenosis).
Symptoms:
- Stridor (Biphasic).
- Haorseness (Absent): no affection of VC.

Signs: Flexible laryngoscopy or Indirect laryngoscopy show the stenosis.

Investigations:

1) X-ray.
2) CT to show:
Site of stenosis.
Degree of stenosis.
Length of stenosis.
3) D.L. (Direct laryngoscopy).

Treatment:

1- Tracheostomy: in severe stridor.
2- Microlaryngosurgery with laser excision of the stenosis.
3- Laryngo-fissure: with excision of fibrous stenosis and covering the raw area by skin grafts.



Subglottic stenosis (web)

N.B. Laryngeal stenosis became more common nowadays because of the advances in the management of trauma and consequently the decrease in mortality rate.

Symptomatology

Stridor

Def.: Difficulty noisy breathing due to partial upper airway obstruction (Larynx ± Trachea).

Causes:

1. Congenital: All (see before).
2. Traumatic: All (see before).
3. Inflammatory:
- Acute specific (diphtheria)
- Acute non-specific:. Acute laryngitis in children.
  . Acute epiglottitis.
  . Acute laryngotracheobronchitis.
- Chronic Specific (granuloma).
4. Neoplastic: - Benign: Multiple papillomatosis
   - Malignant: Cancer larynx.
5. Miscellaneous: - Bilateral VC paralysis.
   - Laryngeal oedema.

N.B. Causes of stridor in children:

1. Congenital: All
2. Traumatic - FB inhalation.
   - Corrosive laryngitis.
3. Inflammatory: All acute.
4. Neoplastic: Juvenile multiple papillomatosis.
5. Miscellaneous: - Laryngismus stridulus: laryngeal spasm (Calcium deficiency in tetany).
   - Laryngeal oedema.

Clinical picture of upper airway obstruction:

1. Stridor.
2. Irritability, restlessness and fatigue.
3. Tachycardia (↑ pulse rate).
4. Tachypnea (↑ respiratory rate).
5. Working alae nasi.
6. Working accessory muscles of respiration.
7. Retraction of suprasternal, supraclavicular, intercostal and subcostal spaces.
8. Congested neck veins.
9. **Late signs:** Brady cardia and cyanosis.

N.B.: *The best time to do tracheastomy is when you think about it.*

Hoarseness of Voice

Def.: Rough quality, low-pitched voice due to one or more of 3 factors:

1. Impairment of VC Adduction.
2. Impairment of VC Tension.
3. Impairment of VC Vibration (Mobility).

Causes:

1. Congenital: as web.
2. Traumatic: All.
3. Inflammatory: All acute and chronic.
4. Neoplastic: Benign and malignant tumour reaching to VC.
5. Miscellaneous: * Unilateral VC paralysis.
   * Crico-arytenoid joint arthritis.
   * Hysterical.
   * Laryngeal oedema.

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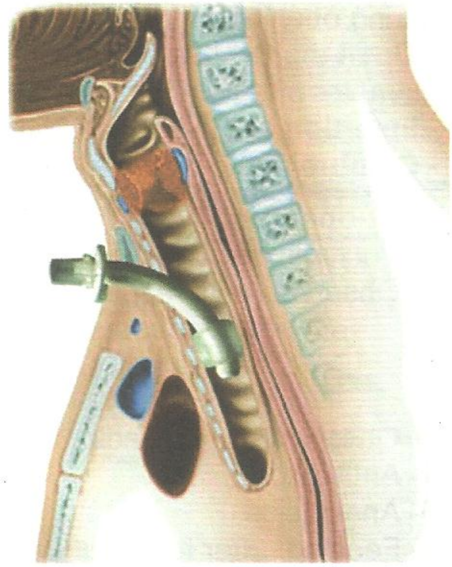
Operations

Indications, types, Post operative care & Complications of Tracheostomy?

Tracheostomy

Definition: Making surgical opening in the cervical trachea.

Indications:



[I] Upper airway obstruction (Stridor):
Causes: see before.

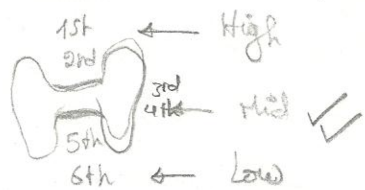
[II] Lower airway obstruction: ↓ Cough R.
In cases of depressed cough reflex when the patient cannot expectorate (the patient drowns in his secretion).
Causes:
1. Prolonged coma: due to
    a. Traumatic: head trauma or car accident.
    b. Inflammatory: meningitis or encephalitis.
    c. Toxic:
    - Endogenous: diabetes and uraemia.
    - Exogenous: barbiturate.
    d. Vascular: THE (Thrombosis, Haemorrhage or Embolism).
    e. Neoplastic: brain tumour.
2. Paralysis of respiratory muscles :
    - Poliomyelitis.
    - Diphtheria.
    - Myasthenia gravis.
3. Severe chest injuries:
    Multiple fractures of ribs.

[III] Part of another operation (Elective): during the following operations
- Angiofibroma.
- Carcinoma of tongue.
- Carcinoma of maxilla.
- Laryngofissure.
- Partial laryngectomy.

} Temporary tracheostomy to avoid aspiration of blood

- Total laryngectomy: Permanent tracheostomy.

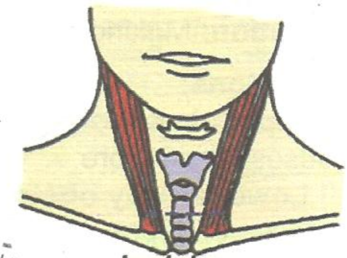
Value of tracheostomy:
1) To by pass obstruction.
2) Aspiration of chest secretion.
3) To decreased dead space to its half. (150)
4) To give humidified O_2.

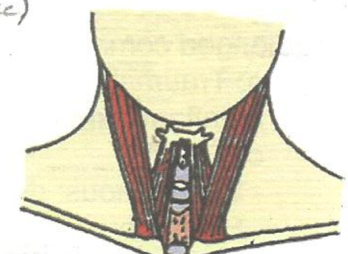


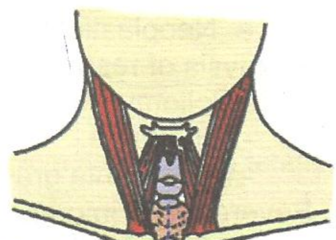
Types of tracheostomy:
1) **High:** opening above thyroid isthmus i.e. in 1st and 2nd tracheal rings.
    (Near the cricoid, so it is not preferred).
2) **Low:** opening below thyroid isthmus i.e. in 5th and 6th tracheal rings.
    (Near thoracic inlet structure, so it is not preferred).
3) **Mid:** opening behind thyroid isthmus i.e. in 3rd, 4th tracheal rings.
    (It is the operation of choice).

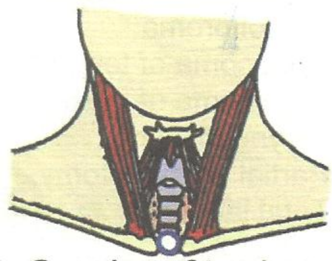
Technique:
- Anaesthesia:
* Without anaesthesia: in urgent cases.
* Local anaesthesia: in most cases (Xylocain in adrenaline).
* General anaesthesia: if the operation was elective.

- **Position:** supine with the head extended.
- **Incision:** vertical or transverse between cricoid and supra-sternal notch.
- **Separation** of pretracheal (Strap) muscles.
- **Transfixion** of thyroid isthmus by 2 Kochers.
- Inject xylocain in the trachea to depress the cough reflex during opening of trachea.
- **Open** the trachea with removal of circular portion equal to the diameter of tracheostomy tube to avoid surgical emphysema.
- **Insertion** of the tracheostomy tube.
- **Closure** of the wound.


Incision


Seperation of muscles


Transfixion of isthmus


Opening of trachea

Post-operative care:

1- Position: semi sitting to facilitate cough.
2- Observation of respiration, obstruction is indicated by:
  - Noise reappears.
  - Voice reappears.
  - Air is not felt by hand.
3- Observation of bleeding.
4- Antibiotics.
5- Analgesics.
6- Feeding: after few hours.
7- Cleaning of tube and suction from it.
8- Extubation:
- After treatment of indication.
- Sometimes, tracheostomy may be permanent as after total laryngectomy.
- Extubation should be gradual; the tube will be closed with cork by day for 2 days and removed by night, if no problem → tracheostomy tube can be removed.

Complications: SHIRIF

1) Shock: anaphylactic shock from local anaesthesia.

2) Haemorrhage: it may be

a. Primary: during the operation may be due to bleeding disorders or vessel injury, treated by ligation or diathermy.

b. Reactionary: within 24 hours from operation, may be due to elevation of blood pressure (normalization) during recovery from anaesthesia.

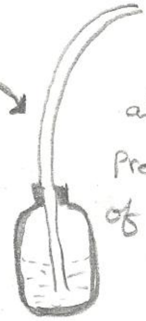
If severe, it should be treated by reanaesthesia then ligation or diathermy of bleeding vessels.

c. Secondary: within 10 days from the operation, it is due to 2ry infection. Treated by sedative (diazepam), antibiotics and in severe cases we can ligate the bleeding vessel away from the wound.

3) Injury:
- Above → to cricoid cartilage (porichondritis → necrosis → stenosis).
- Below → apex of pleura (pneumothorax).
- Laterally → vessels of neck (Haemorrhage).
- Posteriorly → oesophagus (lead to tracheo-oesopheal fistula)

4) Respiratory complications:
- Apnea: Sudden depression of respiratory centre due to CO_2 wash.
Treatment: by carbogen (95% O_2 + 5% CO_2), or mouth to tube breathing.
- Surgical emphysema: trapping of air in the subcutaneous tissue,

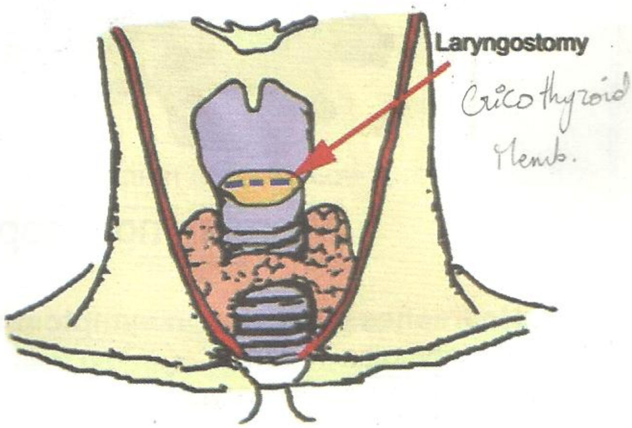
It is due to small tube and wide opening (stoma).
Treatment: by removal of stitches to allow air to pass out.
- **Pneumothorax:** air in the pleural sac (injury to its apex).
Treatment: by under water seal.



- **Obstruction:** due to either
-Obstruction of the tube: usually by dried mucus.
Treatment: dissolve mucus by sodium bicarbonate and suction
Or in severe cases by bronchoscopic removal.
-Slipping of the tube:
Treatment: by insertion of another tube.
5) Infection: either
-Wound infection (local sepsis)
Treatment: by antibiotics and frequent dressings.
-Respiratory infection
Treatment: by antibiotics and frequent suction.
6) Fistula: The opening remains without healing after removal of tracheostomy tube.
Treatment: by removal of fibrosed edge (refreshening) and suture.

N.B.: Indications of low tracheostomy
1- Subglottic stenosis as in laryngoscleroma.
2- Subglottic extension of carcinoma.
3- Multiple papillomatosis in children.

N.B.: Types of tracheostomy tubes:
1-Silastic or metallic tube.
2-With speaking valve or without valve.
3-Cuffed or non-cuffed tube.
4-Single tube or double tube (inner and outer).

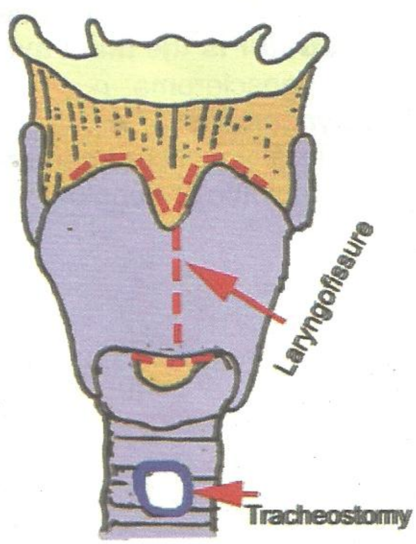


Laryngostomy

Syn.: Laryngotomy or Cricothyrodotomy
Def.: Making surgical opening in the crico-thyroid membrane.
Indications: Stridor if facilities or experience of tracheostomy are not available.

Laryngofissure

Def.: Splitting the thyroid cartilage in the midline to enter the larynx.
Indications:
1- Laryngeal stenosis:
When the length of stenotic area is more than 1cm.
2- Laryngeal tumour:
- Large benign tumour.
- Small malignant tumour (T_1 glottic carcinoma limited to one VC which is mobile).



Direct laryngoscopy

Def.: Direct visualization of the larynx by the use of laryngoscope under general anaesthesia.

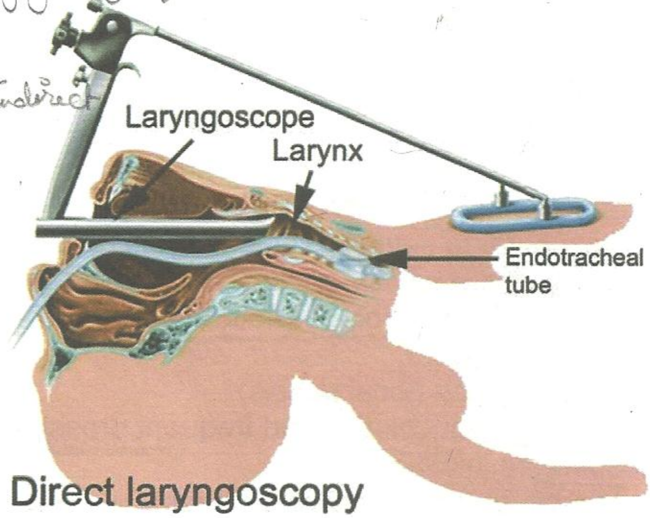
Indications:

1- Diagnostic:

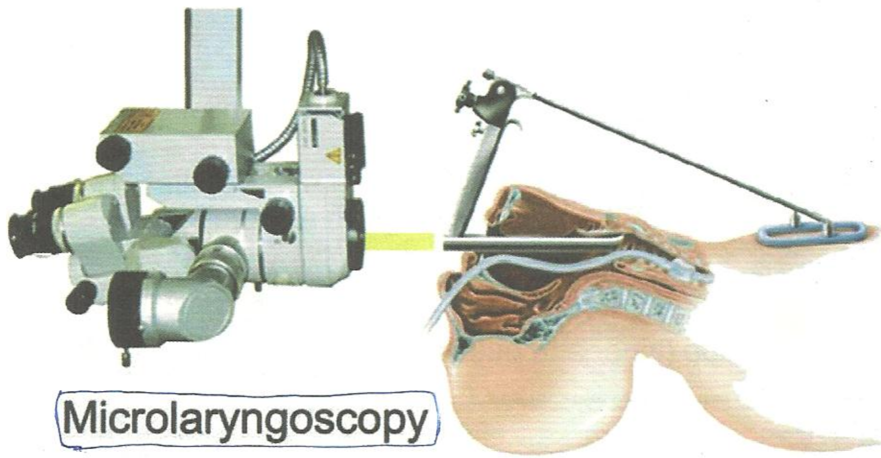
- To examine the larynx when indirect laryngoscopy is difficult (as in children, sometimes in adults).
- To assess a laryngeal tumour (**S**ite, **S**ize, extension, VC mobility, **S**hape, **S**hink) and to take a biopsy.

2- Therapeutic:

- To remove F.B.
- To remove nodule or polyp.
- To remove small benign tumour (papilloma).
- To remove Tis or T1 glottic carcinoma (Laser cordectomy).



Direct laryngoscopy


Microlaryngoscopy

N.B. Hoarseness is the main symptom in:

1- Acute laryngitis in adults.
2- Chronic non-specific laryngitis.
3- Small glottic tumour (benign or malignant).
4- Unilateral vocal cord paralysis.

N.B. Stridor is the main symptom in:

1- Laryngoscleroma.
2- Laryngomalacia.
3- Bilateral vocal cord paralysis.
4- Supraglottic or subglottic tumour not reaching the cord.

Phoniatrics

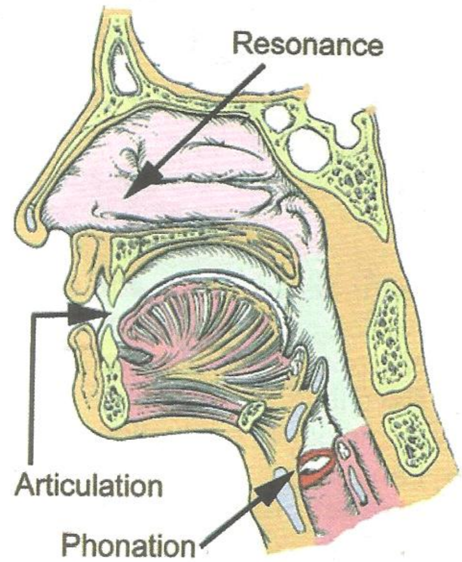
Definition: It is the science that deals with phonation, speech and language.

Phonation: Is the voice production by the larynx i.e. vibration of the adducted tense vocal cords by the expired air.

Speech: Is the articulation of voice (phonation) into words by the movements of tongue, palate and lips.

Language: Is the method of human communication, it has four modalities: comprehension, Speaking, Reading and Writing.

All the above needs normal CNS function.



-Defects in phonation (Voice):
Hoarseness or Dysphonia.

-Defects in Resonance:
Rhinolalia clausa (in bilateral nasal obstruction).
Rhinolalia aperta (in cleft palate).

-Defects in articulation:
Dysarthria.
Dyslalia.
Echolalia.
Stuttering.

-Defects in language:
Delayed speech development.
Aphasia.

Defects in Resonance (Pharynx, Mouth and Nose):

1. Hyponasality (Rhinolalia clausa):
-Decreased nasal tone of voice.
-Inability to produce the letters (N, M and Ng) i.e. obstruction of voice flow through nose.
-Produced by Bilateral nasal obstruction.

2.Hypernasality (Rhinolalia aperta):
-Increased nasal tone of voice.
-Inability to produce the letter (K) i.e. Escape of voice flow through the nose.
-Produced by velopharyngeal incompetence (as cleft palate).

Defects in Speech (Articulation):

It is due to defects in the muscles of articulations (tongue, palate and lips), their nerve supply (5, 7, 10 and 12) or the CNS.

1. Dysarthria: Difficult articulation of speech.
a) Slurred speech: defect in labial (B) and dental (F) letters.
Caused by lesions in pyramidal tract or nerve supply of muscles.
b) Staccato speech: interrupted and explosive syllables.
Caused by lesion in the cerebellum (co-ordination).
c) Monotonous speech: Expressionless speech.
Caused by lesion in the extrapyramidal tract.

2. Dyslalia: Improper articulation of speech.
i.e. certain letters pronounced in abnormal manner as S→th and R→gh.
Caused by defects in articulation muscles or functional defects with no organic lesion.

3. Echolalia: repetition of the last syllables that the patient hears.

4. Stuttering: Hesitation during speech and repetition of syllables.

Defects in Language:

1. Delayed language development:

- Definition: Lack or delayed development of language before it is fully acquired.
- Causes:

1- Motor defect: as brain damage.
2- Sensory defect: i.e. sensory deprivation as hearing or visual impairment.
3- Psychiatric defect.
4- Environmental defect (defect of learning).

2. Aphasia:

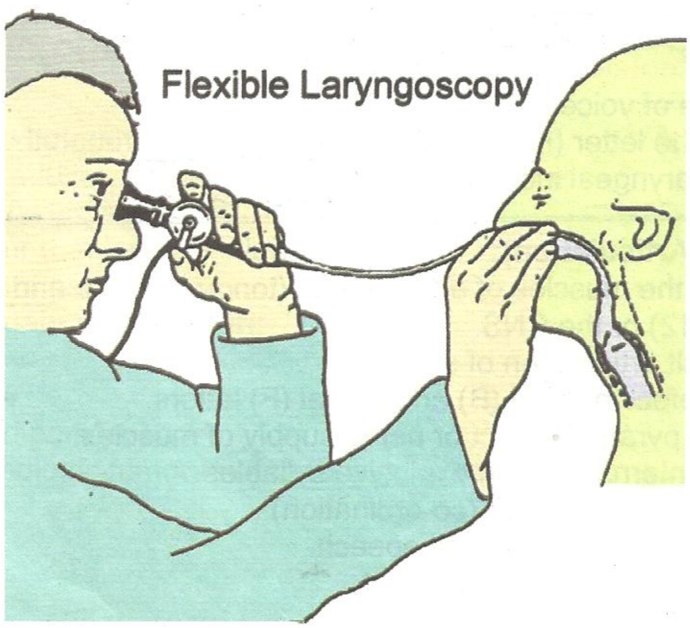
- Definition: Loss of language ability after it has been acquired.
- Causes: Lesions in the speech center in the dominant hemisphere (i.e. central)

Investigations of speech and language defects:

1- Audiological evaluation.
2- Neurological evaluation.
3- Psychiatric evaluation.
4- Radiological evaluation.
5- Language assessment (in language defect).

Investigations of phonation (voice) defects:

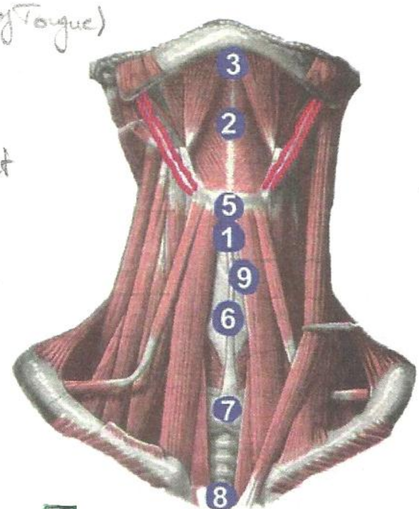
1- History taking.
2- Examination of the larynx:
-Indirect laryngoscopy.
-Flexible laryngoscopy.
3- Investigations for the larynx:
- Direct laryngoscopy.
- Stroboscopy: see VC paralysis.
- CT (if indicated).



Neck Swellings

A - Midline neck swellings:

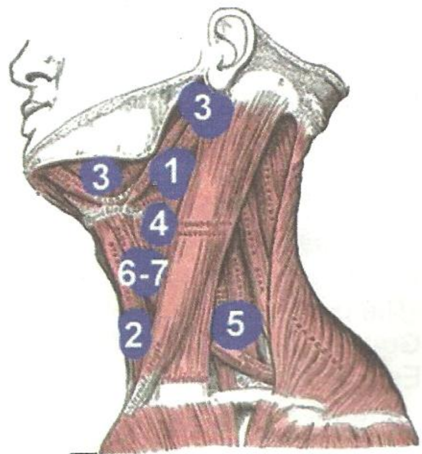
1- Thyroglossal cyst.
2- Dermoid cyst.
3- Submental lymph node enlargement.
4- Lingual thyroid.
5- Subhyoid bursa.
6- Prelingual and pretracheal lymph node enlargement.
7- Thyroid isthmus nodule (Adenoma).
8- Thymus tumour.
9- Laryngocele.



A Midline neck swellings

B- Lateral neck swellings:

1- Lymph node enlargement.
2- Thyroid swelling.
3- Salivary gland swelling.
4- Branchial cyst.
5- Cystic hygroma.
6- Neurogenic tumour (neurofibroma).
7- Carotid aneurysm (pulsating).
8- Pharyngeal pouch.



B Lateral neck swellings

Thyroglossal cyst

- It is the commonest midline neck swelling.
- It can develop at any point in the thyroglossal duct, which descends from foramen caecum of tongue base downwards in front, behind or through hyoid bone to form the thyroid isthmus (the commonest site is infrahyoid).

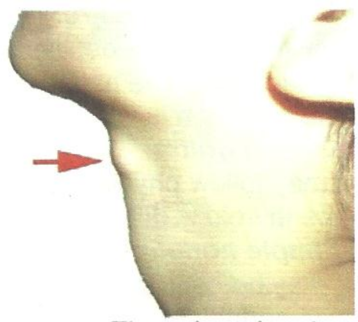
Clinical picture: cystic swelling in midline, which moves up with deglutition and protrusion of tongue.

Complications: Thyroglossal fistula due to rupture of infected cyst or incomplete removal of the cyst (i.e. Acquired, never congenital).

Treatment: Sistrunk's operation in which:

-The cyst is removed.

-All of the thyroglossal tract with the middle part of hyoid bone and central core of the tongue base should be removed.

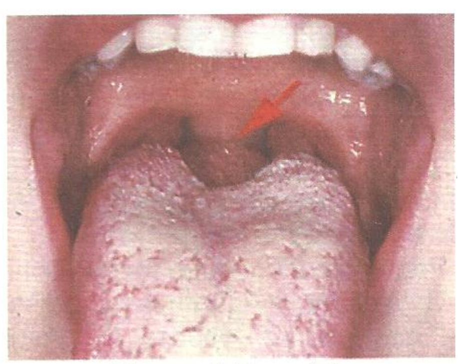


Thyroglossal cyst

Lingual thyroid

- Caused by failure of thyroglossal duct to descend.

Clinical picture: swelling at the tongue base (at foramen caecum), may enlarge to cause dysphagia or respiratory obstruction.



Lingual thyroid

Laryngocele

- It is a cystic herniation of laryngeal saccule (anterior extension of ventricle) through thyrohyoid membrane.

"لا بالقدرة ولا بالقوة بل بروحي يقول رب الجنود"
✝

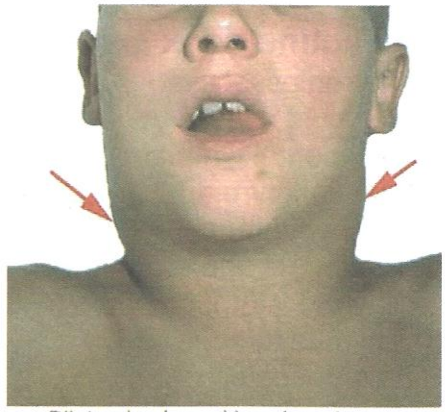
Lymph node enlargement

May be inflammatory or neoplastic.

a) Inflammatory:

- Acute specific: as in diphtheria and Vincent's angina.
- Acute non-specific: as in acute tonsillitis and pharyngitis
- Chronic specific: T.B. and syphilis.
- Chronic non-specific: as in dental caries and chronic tonsillitis.
- Systemic infections (causing generalized lymphadenopathy): As Infectious mononucleosis, Brucellosis, Toxoplasmosis and AIDS.

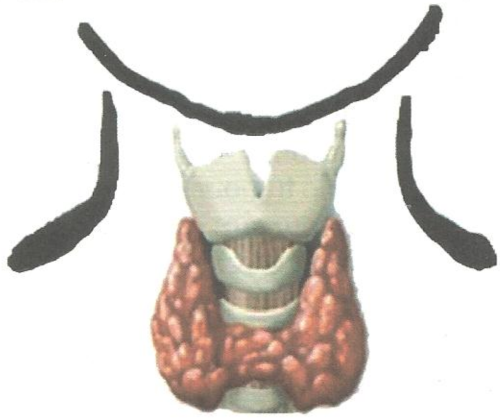
N.B.: Acute lymphadenitis:
The lymph nodes are enlarged, firm and tender with infection in the area drained by these nodes.


Bilateral enlarged lymph nodes

N.B.: Persistent lymph node enlargement (especially if painless) for more than a month → T.B or malignancy should suspected.

b) Neoplastic:

- 1ry malignant tumour: lymphoma.
- 2ry malignant tumour: metastasis.
- Leukaemia.



Thyroid swelling

Embryology:

-The middle part (isthmus): develops from thyroglossal duct (descends from the foramen cecum of the tongue).
-The lateral parts (lobes): from ultimobranchial body of the 4th branchial arch.
-The para-follicular c-cells develop from neural crest.

Goitre:
Enlarged thyroid and presents as swelling in the lower part of the front of the neck, moves up and down with deglutition and dose not move with protrusion of tongue.

- Pathogenesis: ↓ Iodine →↓ T_3 and T_4 synthesis →↑ TSH →↑ Thyroid gland.
- Types:

**** Physiological goitre:***
-Caused by iodine deficiency especially at the time of endocrinal stress as at puberty, pregnancy and lactation. The patient is euthyroid.
-The condition is usually reversible, corrected by iodized salts.

**** Colloid goitre:***
-It may follow physiological goiter due to prolonged iodine deficiency, the patient is euthyroid.
-The thyroid is diffusely enlarged (butterfly in shape) with smooth surface.

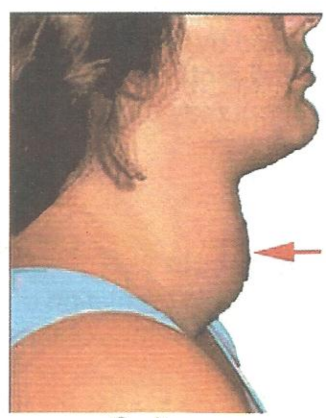
**** Simple nodular goitre:***
-It may be caused by repeated cycles of iodine deficiency and incomplete correction leading to multi-nodularity, the patient is euthyroid.
-The thyroid is enlarged and shows multiple nodules, which are firm and not tender.

**** Toxic goitre: either***

1ry thyrotoxicosis (Grave's disease):
Autoimmune disease due to the presence of LATS.

2ry thyrotoxicosis (Plummer's disease):
Toxic nodular goitre (↑ activity in simple nodular goitre).
In both types, the patient shows manifestations of hyperthyroidism.

N.B.: Retrosternal goitre:
-Presence of enlarged thyroid behind the sternum (i.e. Intra thoracic).
-Caused by -ve intrathoracic pressure leading to descent of goitre.
-It may lead to: Dyspnea, dysphagia and congested neck veins.

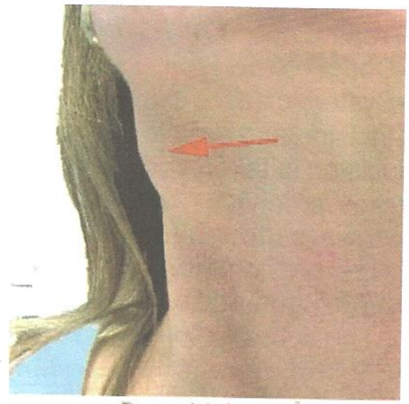

Goitre

†

*** Tumours of the thyroid gland:**
Benign: Follicular adenoma.
Malignant:
Differentiated (papillary and follicular carcinoma).
Undifferentiated (Anaplastic carcinoma).
Medullary carcinoma.
Lymphoma.
- Papillary carcinoma: Lymphatic spread is common.
- Follicular carcinoma: Blood spread is common.
- Anaplastic carcinoma: Local spread is common.
- Medullary carcinoma: Blood and lymphatic spread is common. It may be familial and secrete calcitonin.

Branchial cyst

-Cystic swelling at the anterior border of upper third of sternomastoid.
-It is formed of remnants of 2nd branchial arch.
-Branchial fistula: may be
* Acquired: due to rupture of infected branchial cyst, or incomplete removal.
* Congenital: present along anterior border of lower third of sternomastoid.
-Treatment: surgical removal (care should be taken as the tract may pass through carotid bifurcation to the pharynx).


Branchial cyst

Cystic hygroma

-Cystic swelling in the posterior triangle of the neck formed of lymphoid tissues.
-It is due to persistence of the primitive lymph sac.

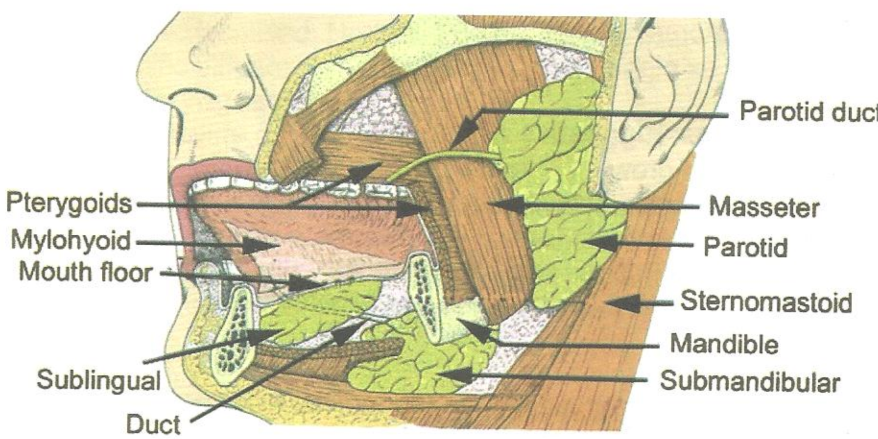

Cystic hygroma

Salivary gland swellings

May be inflammatory or neoplastic.

Parotid gland:
-Present below and infornt of the Auricle.
-The facial nerve passes through its tissue, dividing it into superficial and deep lobes.
-The deep lobe present lateral to the parapharyngeal space.
-The parotid duct (Stenson's duct) opens into the inner aspect of the cheek (opposite upper 2nd molar tooth) after piercing of the Masseter.

Submandibular gland:
-Present between the body of mandible and mylohyoid muscle.
-Formed of two parts, superficial and deep to mylohyoid (continuous with each other).
-The submandibular duct (Wharton's duct) opens into the floor of mouth.
-The mandibular branch of facial nerve (supplying the mouth angle) present in the deep fascia overlying the gland.



-The deep part of the gland related superiorly to lingual nerve and inferiorly to hypoglossal nerve.

A) Inflammatory:

Sialadenitis:

Def.: Inflammation of salivary glands.

Causes:

1- Retrograde infection from oral cavity.

2- Blood borne infection. It may be bacterial or viral (as mumps).

Clinical picture:

Symptoms: Painful swelling below the ear or in submandibular region.

Sings: Tender swelling (site?) become fluctuant if suppurated.
Pus coming from the duct on squeezing.

Treatment:

-Complete bed rest + plenty of warm fluids.

-Systemic antibiotics + Analgesic, antipyretics.

-Incision and drainage if suppuration occurred (to avoid injury of facial nerve in the parotid, the skin incision is taken vertically for cosmoses and the parotid fascia is opened by artery forceps transversely).

Salivary stones (calculi):

It is more common in the submandibular than in the parotid as:

1-The submandibular secretion is viscid while parotid secretion is watery.

2-The submandibular drainage is against gravity.

N.B. Submandibular swelling may be enlarged salivary gland or enlarged lymph nodes.

Salivary gland	Lymph nodes
Solitary	Multiple
Cannot be rolled over the lower border of mandible (deep).	Can be rolled over the lower border of mandible (superficial).
Better felt from oral cavity (Bimanually)	Better felt from outside (superficial).

B) Neoplastic:

Site:

- Parotid gland: the commonest (80%).
- Submandibular gland: 10%.
- Sublingual and minor gland: 10%.

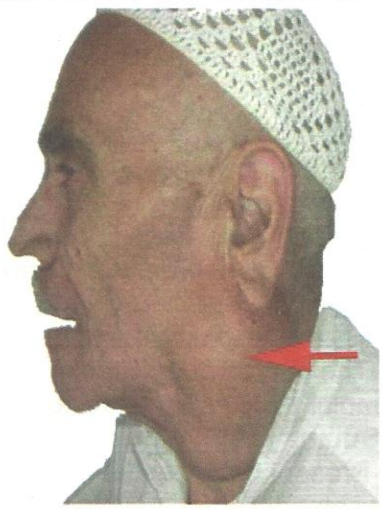
Types:

1-Benign: more common.

- Pleomorphic adenoma (mixed salivary tumour): The commonest.
- Warthin's tumour: Adenolymphoma
- Lymphangioma and Haemangioma.

2-Malignant tumour:

- Adenoid cystic carcinoma: The commonest.
- Mucoepidermoid carcinoma.
- Adenocarcinoma.
- Carcinoma ex pleomorphic adenoma.
- Lymphoma.


Enlarged parotid gland

Manifestations suggestive of malignancy:

1- Rapid rate of growth (↑ size).

2- Pain with referred otalgia.

3- Facial paralysis.

4- Late signs: Hardness and fixation to surrounding structures (e.g. fixed TMJ).
Cervical lymph node enlargement.

Treatment:

* Parotid tumour:

Benign: Superficial parotidectomy (superficial lobe) or total parotidectomy (deep lobe) with conservation of facial nerve.

Malignant: Total parotidectomy with sacrification of facial nerve and RND

* Submandibular: Complete removal of the gland (sialadenectomy).

* Sublingual and minor salivary gland: complete removal.

LASER in ENT

Def.: Light **A**mplification by **S**timulated **E**mission of **R**adiation.

Characters: - Laser contains only one wavelength.
- All parallel in one phase (coherent).

Mechanism of action: Evaporation of water contents, i.e. burning, act as scalpel but haemostatic.

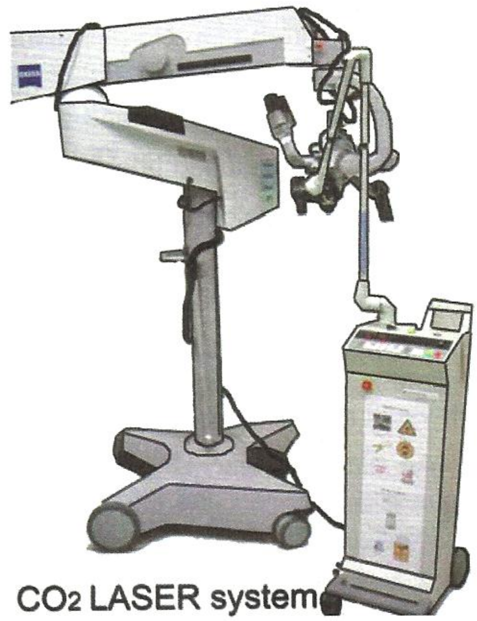
Types of laser:

CO_2 laser:

- Wave length = 10.6 μ.
- Invisible (carried in another red light).

Advantages: Less bleeding than the conventional surgery.

Disadvantages:
- Can't be transmitted by fibroptic system.
- Can't seal blood vessel more than 0.5ml in diameter.



CO2 LASER system

Argon:
- Visible (blue green).
- Can be transmitted by fibroptic system.

KTP:
- Visible (green).
- Can be transmitted by fibroptic system.

Nd/YAG:
- Invisible.
- Can be transmitted by fibroptic system.

Holmium:
- Invisible.
- Can be transmitted by fibroptic system.

N.B.: - All are invisible except argon and KTP.
- All can be transmitted by fibroptic system except CO_2.

Uses of Laser in ENT:

(1) In mouth and pharynx:

* **LAUP:** For treatment of snoring due to large uvula, soft palate and tonsils.

Advantages: - Short stay in hospital.
- Can be done under local anaesthesia.

* **Tonsilectomy.**
* **Lingual tonsillectomy.**
* Partial glossectomy in OSA (see snoring).
* Removal of vascular lesions.

(2) In Larynx:

*Congenital: **Web**, laryngomalacia, cyst, stenosis, and hemangioma.

*Traumatic: Subglottic stenosis (chronic).

*Inflammatory: - Chronic non-specific localised: Nodule, Polyp, Leukoplakia.
- Chronic non-specific diffuse: chronic laryngitis (stripping).
- Chronic specific: **laryngoscleroma**.

*Neoplastic: - Benign: Multiple **papillomatosis** of children.
- Malignant: . T_1 glottic Ca.
. Advanced cancer larynx to open the airway (debulking).

*Miscellaneous: Bilateral vocal cord paralysis (**arytenoidectomy** ± posterior cordectomy).

(3) In nose:
- **Turbinectomy:** Done under local anaesthesia + No tight back + Less bleeding.
- Removal of vascular lesions.
- DCR (DacryoCystoRhinostomy)

(4) In Ear:
- Removal of auricular lesions, e.g. haemangioma.
- Laser myringotomy.
- Laser stapedotomy.
- Removal of acoustic neuroma.

Quiz

What is your provisional diagnosis? And
How to mange these cases?

1- An old man with right ear deafness and tinnitus associated with right nasal obstruction and epistaxis. Examination of the right ear showed absent cone of light with bubbles behind intact yellowish drum.

2- A young boy with unilateral nasal obstruction and epistaxis, examination showed unilateral nasal mass, which is pink and bleeds on touch.

3- A woman developed hoarseness of voice after neck surgery.

4- A woman developed stridor after neck surgery.

5- A child with a history of repeated upper respiratory tract infections. His teacher reported deterioration in his scores and lack of his concentration in the class.

6- An old man who is a chronic heavy smoker developed hoarseness of voice, which was progressive for a month. Examination of his larynx by indirect laryngoscopy revealed vocal cord polypoid mass.

7- An old man who is a chronic heavy smoker developed hoarseness of voice. He started to complain of cough and infrequent heamoptysis for the last 6 months Examination of his larynx by indirect laryngoscopy revealed left vocal cord paralysis.

8- A female patient complained of progressive dysphagia and loss of her weight for the last 2 years. Her blood picture showed microcytic hypochromic anaemia.

9- A 40 year old woman complained of diminution of hearing and tinnitus in both ears. Otoscopic examination of the ear showed no abnormality, tuning fork tests showed bilateral CHL more on the right side.

10- A man with a long history of chronic discharging left ear, developed headache and blurring of vision. Otoscopic examination of his left ear showed granulations and discharge.

11- An old diabetic female developed facial pain and headache with bilateral nasal obstruction, offensive discharge and proptosis of right eye followed by blindness.

12- An old diabetic patient with severe pain of right ear associated with discharge developed right facial paralysis. Examination of the right ear revealed granulations in the EAC with intact normal tympanic membrane.

13- A diabetic patient with a long history of left ear discharge developed left facial pain and left convergent paralytic squint. Examination of the ear showed perforated drum and discharge.

14- A 2 year old child developed common cold followed 2 days later by severe inspiratory stridor, hoarseness and cough.

15- A 3 year old child with left nasal obstruction and offensive discharge for a week.

16- A 35 year old man was a victim to a car accident developed right nasal watery discharge and headache. Examination of the nose showed no abnormality.

17- A 35 year old man was a victim to a car accident developed right ear bloody discharge and headache. He was transferred to the hospital, and on the next day he developed right facial paralysis. Examination of the ear showed traumatic perforation of the tympanic membrane.

18- A young boy developed sudden respiratory difficulty, which improved spontaneously followed 2 days later by cough and dyspnea.

19- An old female had a severe attack of bilateral epistaxis following recurrent attacks of headache. Examination of her nose showed no abnormality and she was referred to a doctor of general medicine.

20- An old male with right nasal obstruction developed epistaxis from the right side. Examination of the nose showed right nasal friable pink mass, which was not tender.

21- A young child with nasal tone of voice complained of diminution of hearing. Examination showed cleft soft palate and intact yellowish tympanic membrane with loss of cone of light.

22- A child 1.5 year old got up by night crying and feverish; running nose on the day before preceded these manifestations.

23- A 50 year old man presented with deafness and pulsatile tinnitus in his right ear. Examination of the right ear showed reddish drum and his bone conduction was better than air conduction.

24- A diabetic 45 year old woman presented with left nasal offensive discharge, pain over the left side of the face and regurgitation of fluid for a week. She gave history of extraction of one of her teeth on the same side 10 days ago.

25- A 55 year old woman developed deafness and tinnitus in her left ear. Otoscopic examination showed no abnormality in both ears. Audiological study showed moderate to severe SNHL in the left ear with normal hearing in the right ear. MRI was recommended.

26- A 35 year old man who is a chronic heavy smoker developed severe dysphagia, fever and tender submandibular swelling followed 3 days later by respiratory difficulty. Examination of his oral cavity showed dental caries, gingivitis with congested elevated floor of the mouth.

27- A 50 year old man developed painless swelling in the upper part of the left side of his neck. He gave history of hoarseness of voice for the last 5 months, which was slowly progressive but not associated with stridor or dysphagia. He was a smoker but he gave up smoking 4 years ago.

28- A 3 month old infant presented with intermittent attacks of inspiratory stridor that increase with lying on the back and improve on lying prone. His crying showed no hoarseness. Examination of his larynx showed curling epiglottis that prevents viewing of the vocal cords.

29- A 30 year old female referred to the emergency unit with severe stridor that necessitates tracheostomy. Examination of her nose showed bilateral nasal crustations.

30- A 25 year old man presented with right ear deafness, tinnitus and intermittent odourless discharge. Examination of right ear showed central perforation. Rinne test revealed that air conduction was less than bone conduction in the right ear, while Weber test showed lateralisation of hearing to the right ear.

31- A 2.5 year old child presented with right facial nerve palsy preceded by common cold and pain in his right ear. Examination showed intact reddish tympanic membrane of the right side.

32- A 5 year old child presented with painful tender midline neck swelling that moves up and down with swallowing and with protrusion of the tongue. Examination of the mouth and tongue revealed no abnormality.

33- A chronic heavy smoker old man presented with right earache for the last 2 months. He gave long history of right ear deafness, tinnitus and discharge. Examination of the right ear showed reddish mass which bleeds on touch. CT was recommended.

34- A 15 year old girl developed left facial nerve paralysis preceded 1 day before by left earache. Examination of both ears showed normal intact tympanic membrane. CT and MRI showed no head and neck abnormalities.

35- A 50 year old female presented with right eye proptosis, oedema of eyelid, pain, limitation of movement and progressive visual deterioration. She gave history of recurrent attacks of bilateral nasal obstruction, discharge, facial pain and headache. Examination of her nose showed right yellowish nasal discharge but no masses.

36- A 20 year old female presented with right earache and discharge. She gave history of ear wash 2 days before which was painful in the right ear associated with water coming from the right side of the nose.

37- A newborn presented with difficulty breathing, bilateral nasal discharge and intermittent cyanosis. Examination of the nose showed bilateral mucoid discharge and examination of the larynx showed no abnormality. CT skull was recommended.

38- A 15 year old student with a long history of left ear discharge developed persistent fever, headache and neck rigidity. Examination of the ear showed foul discharge and granulations.

39- A 50 year old man presented with dysphagia for solids and progressive loss of weight for the last 3 months. He developed neck swelling on the right side 3 weeks ago.

40- A 25 year old female with right ear discharge of 7 years duration developed spiking fever and earache. Examination of the neck showed tenderness along the anterior border of the upper part of sternomastoid. Her blood picture showed severe anaemia.

41- A 20 year old male patient complained of dull aching pain over the forehead for the last one year. The pain increased in the morning and then decreased gradually associated with intermittent nasal discharge. One week ago the pain became very severe with complete nasal obstruction and fever with deterioration of general condition; lastly he became drowsy with mental behavioral changes, vomiting and blurring of vision.

42- 6 hours after tonsillectomy for a 7 year old child, the pulse was 110/min., blood pressure 90/60, respiratory rate 20/min. and he vomited about 200cc of a dark fluid. 2 hours later he vomited another 150 cc of the same fluid, the pulse became 130/min., the blood pressure became 80/50.

43- A 20 year old female patient gives history of fever and difficulty of swallowing of 3 days duration. The condition progressed to throbbing pain and swelling in the left side of neck with severe dysphagia and dribbling of her saliva.

44- A 5 year old boy developed changes of his voice that was followed by stridor. The stridor became severe that necessitate tracheostomy. Direct laryngoscopy showed multiple polypoid tissues that were removed. The condition recurred after one year and surgical intervention was carried out again.

45- A 3 year old girl developed dysphagia and loss of her weight with choking during feeding for the last 4 months. The child was admitted to hospital for investigations. The barium swallow showed a very long oesophageal stricture.

46- A 40 year old patient with long history of scanty foul discharge from his left ear started to complain of fever and headache. On examination the temperature was 39.5C, he had also projectile vomiting and papilledema.

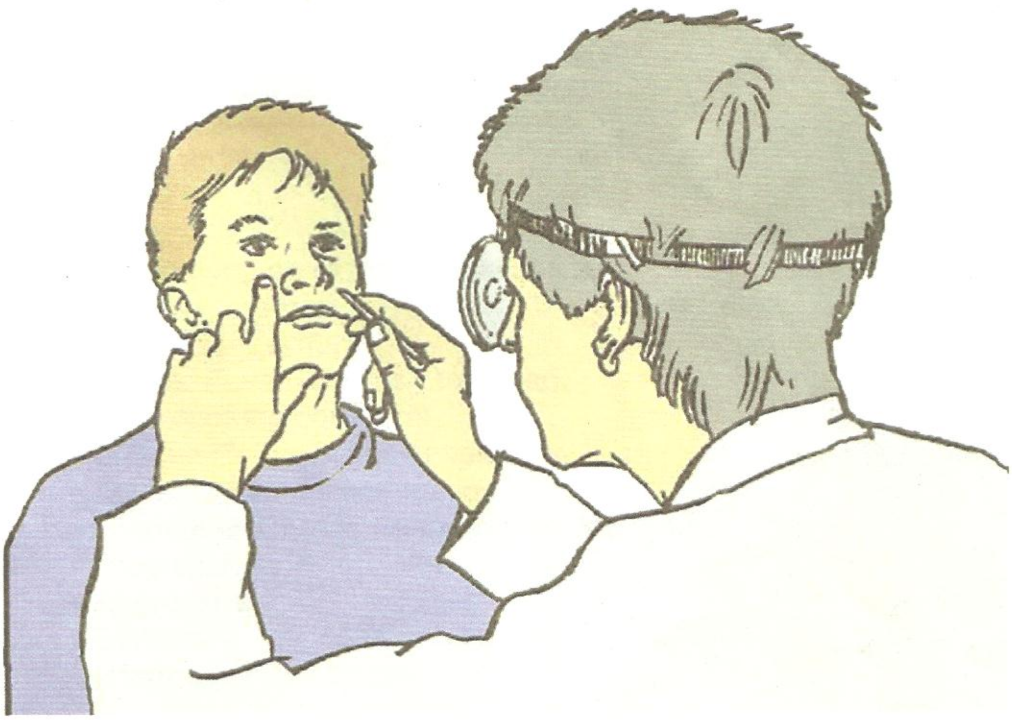
47- A 25 year old female had an attack of left severe earache and diminution of hearing together with inability to close the left eye and deviation of mouth angle to the right side. 4 days later vesicular eruption appeared in the left external auditory meatus and conchal part of auricle.

48- A 60 year old male patient experienced left earache 3 months ago. One month later a swelling appeared in the left side of the neck that progressively increased in size.4 days ago he complained of change of his voice together with dysphagia. On examination by indirect laryngoscopy there was froth behind the left side of the larynx.

49- A 20 year old male patient is complaining of bilateral nasal obstruction of 5 years duration. He gave a history of sneezing, lacrimation and bilateral watery nasal discharge that sometimes become yellowish green. Anterior rhinoscopy showed bilateral grape-like smooth glistening masses with clear nasal discharge.

50- A 6 year old boy was seen by an ophthalmologist for headache of 2 months duration. Headache was present between the eyes. No ocular cause was detected and the child referred to an otolaryngologist who noticed nasal tone of voice with bilateral nasal obstruction. The mother reported that her child opens his mouth and snores during sleep and also he has repeated attacks of chest infection.

Clinical ENT



Clinical ENT

General Sheet

History taking

(1) Personal history:

1- Name: To be familiar with the patient.

2- Age:
- Young:
  - Congenital diseases
  - Angiofibroma.
- Old:
  - Cancer.
  - Senile disease.

3- Sex:
- Male:
  - Angiofibroma only in males.
  - Cancers are more common in males.
- Female:
  - Otosclerosis is more common.
  - Rhinoscleroma and atrophic rhinitis are more common.

4- Marital Status.

5- Occupation:
- Noise ➔ SNHL (sensorineural hearing loss)
- Pollution ➔ Rhinosinusitis.

6- Residence: e.g. Rhinoscleroma is more common in certain areas in Egypt as Sharkya.

7- Special habits:
- Smoking ➔ Chronic laryngitis, pharyngitis and sinusitis. Cancer larynx.
- Alcohol ➔ Cancer Larynx.

<u>N.B.</u>: *All these points should be written in paragraph.*

(2) Complaint:

- The patient's own wards.
- Do not use medical terms.

(3) Present history:

1- Onset, course and duration of the complaint (OCD).

2- Symptoms of the same organ.

3- Symptoms of other ENT organs.

4- General symptoms: Fever - Rigors - Vomiting.

<u>N.B.:</u> OCD is analysis of the complaint.

- Onset:
  - Sudden ➔ Traumatic or vascular.
  - Acute ➔ Acute inflammation.
  - Gradual ➔ Chronic inflammation or tumour.
- Course:
  - Progressive
  - Regressive
  - Stationary
  - Intermittent or fluctuant.
- Duration.

Every organ in ENT has 10 symptoms, and you have to ask about, in the present history.

(4) Past history:

- Past history of ***diseases*** of the affected organ.
- Past history of ***trauma.***
- Past history of ***operations.***
- Past history of ***medications*** (related to the diseased organ).
- Past history of ***other ENT*** organs.
- ***General diseases*** as:

Hypertension, Diabetes, Syphilis, T.B., other medical problems as chest or heart diseases.

(5) Family history:

- ***Consanguinity***: increases the incidence of congenital diseases.
- ***Similar condition*** in the family.

" فلا تطرحوا نفتكم التي لها مجازاة عظيمة "

+

- ***General diseases***: as diabetes or hypertension.

Examples of familial diseases:

Otosclerosis: +ve family history in about 50% of cases.

Allergic rhinitis: +ve family history in about 50% of cases.

Examination

1- General.

2- Local: **a) Diseased organ.**

b) Other ENT organs.

- **General examination includes:**
  - Pulse.
  - Temperature.
  - Blood Pressure.
  - Respiratory Rate.
  - General condition.

(The general condition in normal subject = the patient is alert, conscious, co-operative, well oriented for time and place and he is of average intelligence).

- Facial nerve examination is a part of Ear examination.
- Orbital examination is a part of nose examination.
- Neck examination is a part of throat examination.
- Cranial nerve examination may be needed if your case has cranial nerve palsies or certain cases.

Ear

History taking

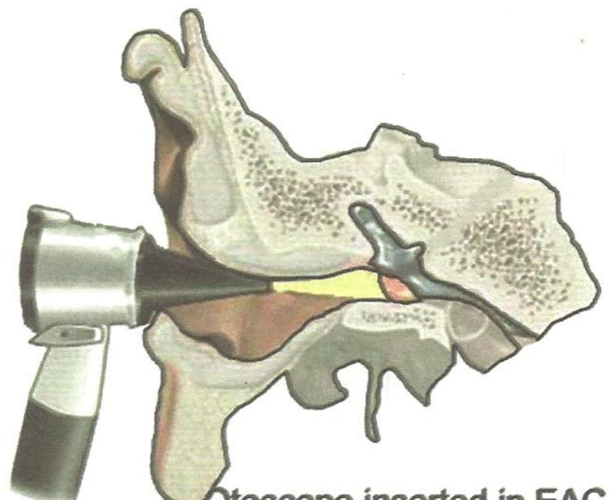
- Personal history: As before.

- Complaint:

- Patient's own wards.
- Don't use medical terms.
- Rt. or Lt. or Bilateral.

- Present history: Ask about

- O.C.D. of the complaint.
- Ear symptoms
- Other ENT symptoms: briefly.
- General symptoms.


Otoscope inserted in EAC

Ear Symptoms:

(1) Deafness: *Diminution of hearing.*

Bilateral or unilateral (Rt. or Lt.)

(2) Tinnitus: *Noise in the ear or head.*

Bilateral or unilateral (Rt. or Lt.).

Character of tinnitus: The most important is the pulsatile tinnitus occurring in vascular lesions as: Glomus tumour, high Jugular bulb and carotid aneurysm.

(3) Discharge:

Bilateral or unilateral (Rt. or Lt.).

Comment on:
- Amount.
- Colour.
- Odour.
- Consistency.

N.B.: You should differentiate between ASOM and CSOM. [Middle Ear]

ASOM has a short duration and the discharge is mucopurulent.

While CSOM has a long duration and the discharge is:

WhiteKnightLove

In safe CSOM: intermittent, odourless, profuse, and mucopurulent.
In unsafe CSOM: persistent, offensive, scanty, and purulent.

(4) Earache: Site, severity, precipitating factors, relieving factors and radiation.

N.B.:* *CSOM is never painful except in:

1- Complication.
2- Acute exacerbation. acute on top of chronic
3- Very rare, neoplastic changes.

(5) Headache: Site, severity, precipitating factors and relieving factors.

(6) Vertigo: hallucination of rotation either of the patient or of the surrounding.

(7) Facial paralysis:

- Deviation of mouth (to the healthy side).
- Inability to close the eye (on paralysed side).
- Accumulation of food behind the cheek (on paralysed side).

(8) Swelling.

(9) Deformity.

(10) Eye symptoms: Vision - Diplopia.

N.B.: Eye symptoms may be present in complicated otitis media.

- Past history:

- Ear diseases.
- Trauma
  - Physical (Noise and explosion)
  - Mechanical (Fracture base of skull).
- Operations.
- Medications: especially Ototoxic drugs.

***N.B.:* Ototoxic drugs**

Aminoglycosides as Neomycin, Garamycin, Gentamycin, Streptomycin.
Diuretics as Frusemide
Salicylates in Large doses
Quinine.
Chemotherapy (Cisplatin)

- Previous ENT diseases.
- General diseases: as before.

- Family History: as before.


Otoscope

Examination

- General: as before.

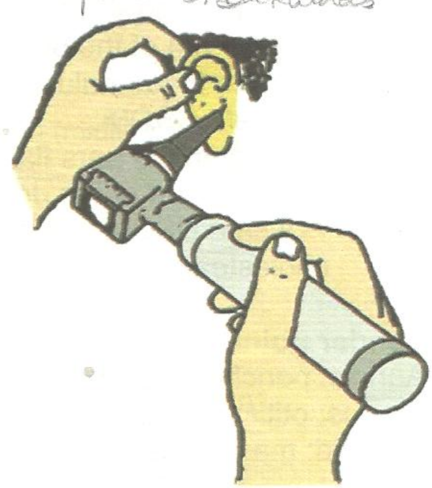
- Local:

Ears (Both).
Other ENT organs: briefly.

N.B.

- The facial nerve should be examined.
- If the case has facial paralysis, you should examine the ear.
- During examination of the EAC, drum and ME mucosa by otoscope, you should pull the auricle upwards and backwards to straighten the EAC and you should also switch on the light of otoscope before introducing it.
- Both ears should be examined.
- Presence of normal cone of light usually indicates normal drum.

upwards & Backwards



†

Examination of the ear:

	Right		Left
Auricle	....	(Deformity or swelling)	....
Pre-auricular	....	(Cyst, Fistula, Scar or Tenderness)	......
Post-auricular	....	(Scar, swelling, fistula, tenderness)	......
Ext. auditory canal	....	(Wax, otomycosis, discharge, polyp)	....
Tympanic membrane			



false -ve fistula Test
① Small
② closed by cholesteatoma
③ Dead ear
④ Technically fault → not efficient seal

Draw the perforation if present, if not seen → write not seen (obscured by wax, discharge or others).

Middle ear mucosa ....(Pale dry, congested and odematous, ... Granulations, polyoid or covered with discharge).

Fistula sign .... (+ve or - ve) ....

Tuning fork tests:

- **Rinne** .... (+ve or - ve) ....
- **Weber** ....(lateralised to which side or central) ....

N.B.: Comment on the facial nerve, if normal you have to say → No abnormality.
N.B: Fistula sign: Pressure on the tragus leads to vertigo and nystagmus in +ve cases.

if aural polyp → Manipulation up & downward

Types of perforations

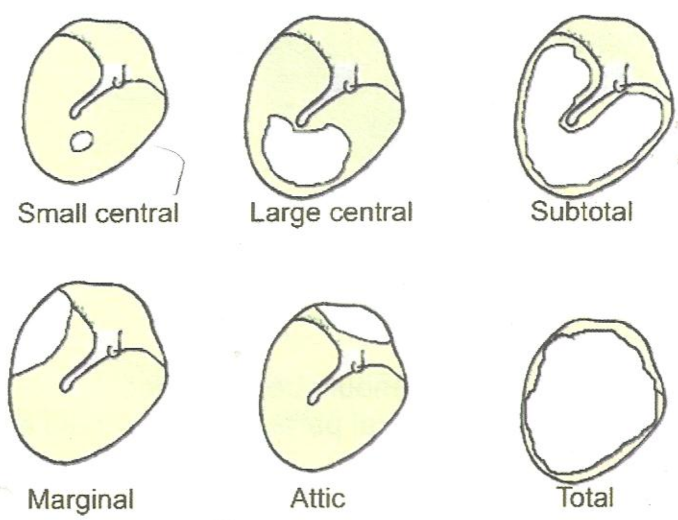
Central: The perforation is surrounded by rim of the drum all round i.e. not reaching to the annulus.
In: - Safe CSOM.
- ASOM
- Traumatic perforation.

Marginal: The perforation is not surrounded by rim of the drum all round i.e. reaching to the annulus.
In: - Unsafe CSOM.

Attic: present in the pars flaccida i.e. in the most upper part of the drum.
In: - Unsafe CSOM (attic cholesteatoma).

Tumour like sac full of cholesterol

Types of perforations



[postero - superior]

Tender points of the ear

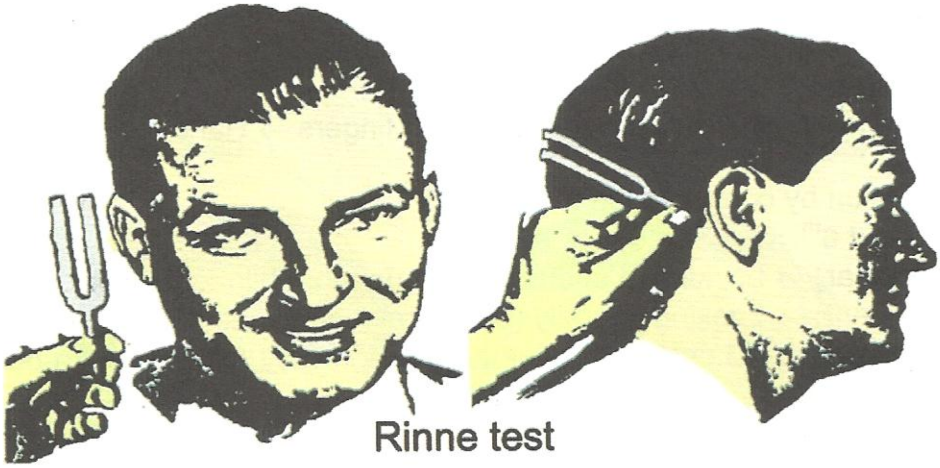
Auricle: perichondritis. → Necrosis of the cartilage (cauliflower ear)
Tragus: otitis externa.
Mastoid: mastoiditis (over the tip, antrum, and posterior border).

"ان الله ليس بظالم حتى ينسى عملكم وتعب المحبة"

Tuning Fork tests

Tuning fork used is 512 Hz (as it is equally heard and felt)

Rinne test:



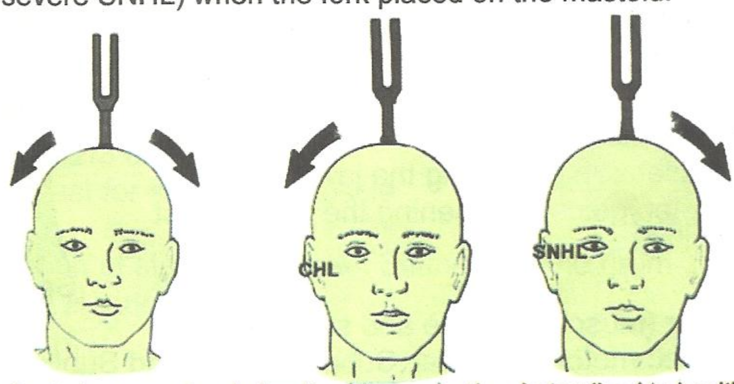
Rinne test

- It compares air and bone conduction (A.C. and B.C.) in the same ear.
- It denotes the type and not the degree of hearing loss.
- It gives valuable results when the hearing loss exceeds 25dB.
- Strike the fork on your elbow or your knee (never on metallic material).
-Bring the fork with both blades parallel near external auditory meatus (1 cm distance) and then on the mastoid and ask the patient which is louder.

Results:

- Rinne +ve: normal hearing i.e. A.C. better than B.C.
- Rinne -ve: CHL i.e. B.C. better than A.C.
- Reduced Rinne + ve: SNHL i.e. A.C. is better than B.C. but both are reduced.
- False Rinne - ve: Severe SNHL (unilateral) i.e. the sound heard by the other ear not the examined ear (which has severe SNHL) when the fork placed on the mastoid.

Weber Test:



Central = normal | Lateralised to conductive | Lateralised to healthy

Weber test

- Comparison of hearing by B.C. between both ears.
- With the tuning fork placed on the central incisor, forehead or chin (midline).
- Ask the patient if the sound is central or lateralised to Rt. or Lt.

Results:

- Central: hearing is equal in both ears = Normal.
- Lateralised to Rt. ear or to Lt. ear:

- In CHL: Lateralised to the conductive side (due to the masking effect to noise).
- In SNHL: Lateralised to the normal or better hearing ear.

Schwabachs test:

Comparison of B.C. between the patient and the examiner (the examiner is normal).

Results:

Normal: duration of hearing is equal (over the mastoid of the patient and the examiner).
CHL: hearing is prolonged by B.C. While in SNHL: hearing is shortened by B.C.

Examination of the Cranial Nerves:

♣ 1st (Olfactory): Smell

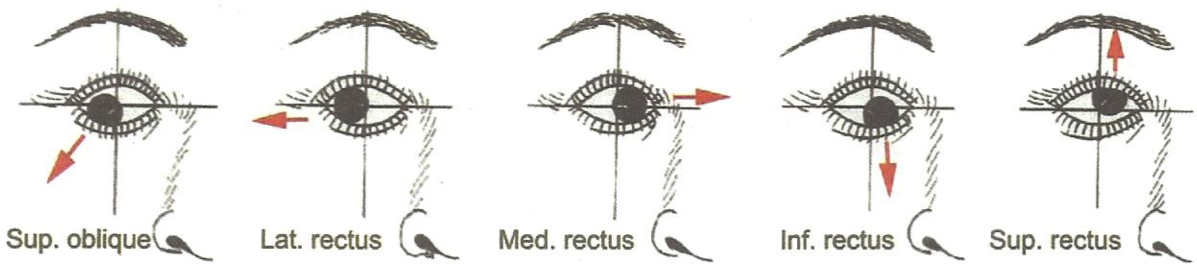
After closure of eyes, every nostril should be examined separately while the other side is closed and the material used for smell should be familiar and non-irritant.

♣ 2nd (Optic): Vision

- Visual acuity by: Snellen's chart → counting fingers → Hand movements → perception of light.
- Field of vision by confrontation test.

♣ 3rd, 4th and 6th :Ocular mobility.

- 4th (Trochlear) → Looking at shoulder (By superior oblique muscle).
- 6th (Abducent) → Looking laterally (By lateral rectus muscle).
- 3rd (Oculomotor) → Looking at all other directions (By All other extra-ocular muscles).



♣ 5th (Trigeminal):

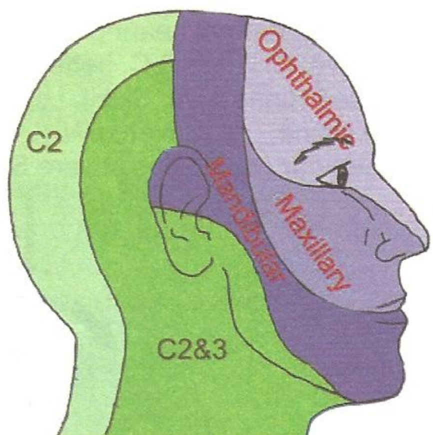
Fibers
- Sensory
  - Ophthalmic
  - Maxillary
  - Mandibular
- Motor (Muscles of mastication).

◆ Sensory: Sensation of face, compare between both sides of the face and then with the angle of the mandible (supplied by C2, 3)

◆ Motor: Muscles of mastication

Temporalis & Masseter: by clinching the jaw.

Medial & Lateral pterygoids: by opening the jaw against resistance.



Sensation of the face

♣ 7th (Facial):

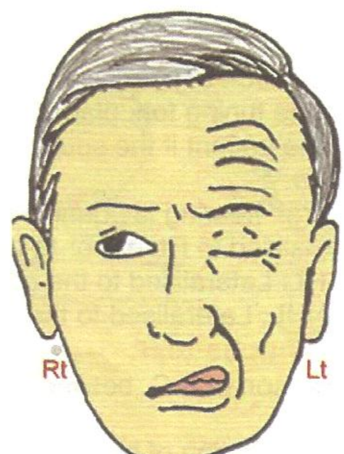
Fibers
- Motor (muscles of face and stapedius)
- Secretomotor (Lacrimal, Submandibulr, and Sublingual salivary glands).
- Sensory (Ant. 2/3 of tongue for taste)

Examination of Facial Nerve:

Motor part:

a) Inspection:
- Loss of corrugation of forehead (diseased side).
- Obliteration of nasolabial fold (diseased side).
- Deviation of angle of mouth to healthy side.

b) Motor power:
- Forntalis by elevation of eye brows.
- Orbicularis oculi by closure of eyes.
- Retractor anguli by showing the teeth.
- Orbicularis oris and Buccinator by blowing and whistling.



Right facial paralysis

N.B.: You should comment on:
- The paralysis is right or left.
- The paralysis is partial (Some visible movements) or complete(no movement at all).
- The paralysis is upper motor or lower motor neuron.

	UMNL	LMNL
- Paralysis	Lower ½ of face (opposite side). 	Upper ½ + Lower ½ of face (same side) i.e. total facial paralysis. 
- Emotional movement	Present	Absent
- Hemiplegia - Muscle tone	Present Increased	Absent Decreased

Secretomotor part:

-Lacrimation by Schirmer's Test

If the difference between both sides exceeds 30% of total → +ve result.



Schirmer's test

-Salivation by Salivary flow test

Sensory part:

-Taste Sensation: from ant. 2/3 of tongue.

N.B.: Stapedial reflex: is a test for stapedius muscle function

Loud sound → Contraction of stapedius → Stiffness of the drum

♣ **8th (vestibulo-cochlear):** Hearing + Balance
- Hearing by tuning fork tests.
- Balance by caloric test.

♣ **9th (Glossopharyngeal):** Pharynx + Tongue base

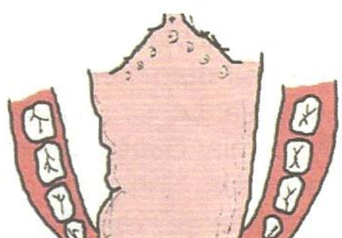
By testing pharyngeal sensation especially supratonsillar fossa.

♣ **10th (Vagus):**
- Vocal cord mobility by indirect laryngoscopy (on saying E)
- Palatal mobility by tongue depressor (on saying A)

♣ **11th (Accessory):**
- Sternomastoid (turning the face to opposite side).
- Trapezius (elevation of shoulder).

♣ **12th (Hypoglossal):** Tongue muscles.

On protrusion of tongue, it will be deviated to the affected side.

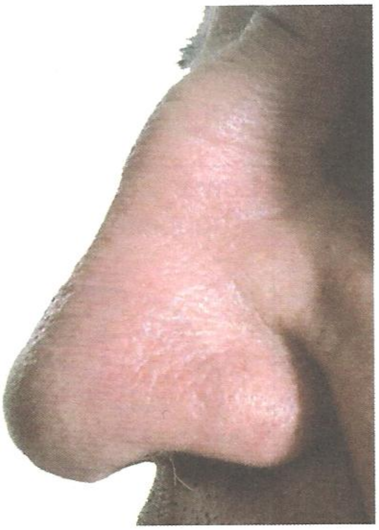


Deviation of tongue to the paralysed side

N.B.: In tongue and pterygoid paralysis, the organ will be deviated to the affected side.

+

NOSE



History taking

(1) Personal History: as before.
(2) Complaint: as before.
(3) Present History: Ask about

- O.C.D. of the complaint.
- Nasal symptoms.
- Other ENT symptoms: briefly.
- General symptoms.

Nasal Symptoms: 10 + Orbital symptoms.

(1) Nasal obstruction:

- Bilateral or unilateral (Rt. or Lt.).

(2) Nasal discharge:

- Bilateral or unilateral (Rt. or Lt.)
- Comment on:
  - Amount.
  - Colour { Whitish: no infection / Yellowish or Greenish: infection.
  - Odour { Offensive: infection / Odourless: no infection
  - Consistency { Purulent. / Mucopurulent. / Watery / Crusty

N.B.: Differential diagnosis of offensive nasal discharge:
- Sinusitis of dental origin.
- FB in the nose.
- Atrophic rhinitis.

(3) Epistaxis:
- Bilateral or unilateral (Rt. or Lt.).
- Severity

If managed by first aid only → the epistaxis was mild.
If transferred to the hospital → the epistaxis was severe.

(4) Facial Pain: Site, severity, precipitating factors, relieving factors and radiation.

(5) Headache: Site, severity, precipitating factors, relieving factors and diurnal variation.

N.B.: Characters of headache due to sinusitis:
- More severe in the morning.
- Its site is over the affected sinus.
- Increases by coughing, straining, and leaning forewords.

(6) Smell disorder:
-Anosmia: Loss of smell.
-Hyposmia: Diminution of smell.
-Cacosmia: Sensation of bad smell.
-Parosmia: perverted sense of smell.

(7) Sneezing: Recurrent attacks = Allergic rhinitis. If present ask about itching.

(8) Snoring: Abnormal noise produced during sleep due to vibration of redundant soft tissues of the oro. / and or hypopharynx.
-If present → you should ask about sleep apnea.

(9) Swelling: site, Rt. or Lt.

(10) Deformity: Deviation, twist or depression.

+ Orbital symptoms: Vision, Diplopia, Proptosis and Epiphora.

(4) Past History:
- Nasal diseases.
- Trauma.
- Operations.
- Medications: especially nasal drops for long period.

N.B.: Nasal drops for long period lead to rhinitis medicamentosa.
- Previous ENT diseases.
- General diseases: as before.

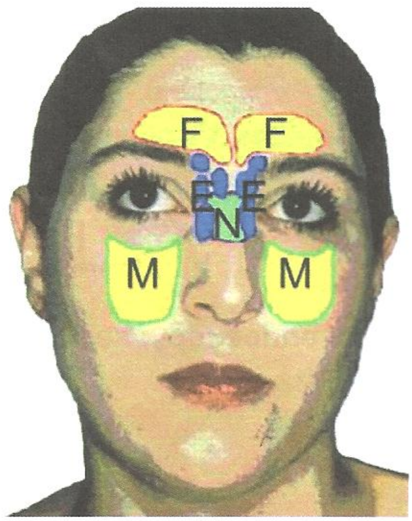
(5) Family History: as before.

Examination:

- **General:** as before.
- **Local:**
  - **Nose**
  - **Other ENT organs:** briefly.

- Orbital examination is part of nasal examination especially in presence of a tumour.
- If your case has a tumour, you should examine:
  - Lymph nodes of the neck.
  - The related cranial nerves as trigeminal and ocular nerves.

Examination of the Nose:



(1) External examination:

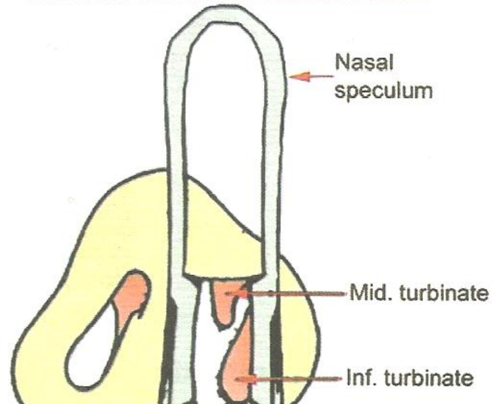
S ➔ Shape.
A ➔ Airflow.
P ➔ Palpation { Over the nose (tender in fracture) / Over the sinuses:

- Frontal sinus:
  - * Over the forehead (anterior wall).
  - * Above the medial half of the eye (floor).
- Ethmoid sinus:
  - * Over the inner canthus.
- Maxillarys sinus:
  - * Over the cheek.

(2) Anterior rhinoscopy:

5 areas will be seen:
- Vestibule
- Nasal cavity
- Septum
- Lateral wall (turbinates)
- Floor

If there is a mass or a polyp, you have to describe it.



Anterior rhinoscopy

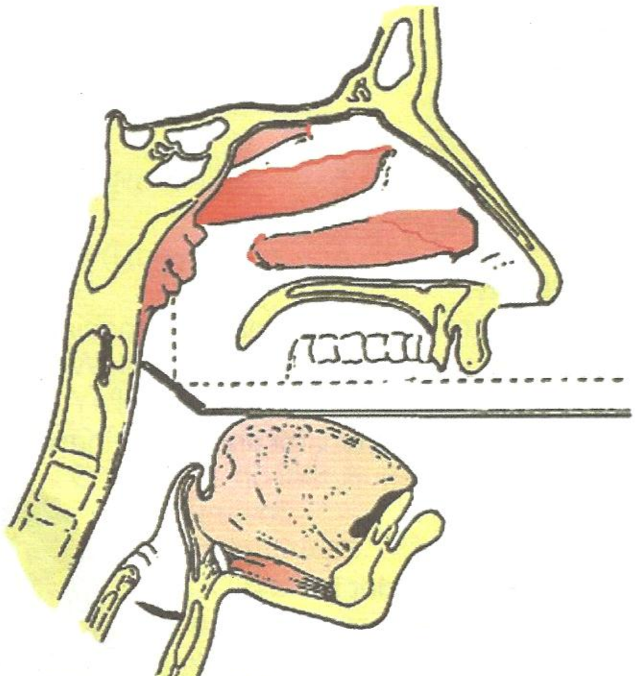
Differential diagnosis of unilateral nasal mass:
1- Antro-choanal polyp.
2- Angiofibroma.
3- Tumour.

Differentiation of a polyp from hypertrophied turbinate:
1- We can introduce a probe to turn all round the polyp.
2- The polyp is insensitive to touch.
3- The polyp is soft, mobile, glistening and grayish white in colour.

(3) Posterior Rhinoscopy and Digital Palpation:
Done by the posterior rhinoscopy mirror while digital palpation done by the index finger. Not used nowadays in the examination of the nose.



Posterior rhinoscopy mirror



Posterior rhinoscpy
Broken line indicates beam of light reflected into nasopharynx

(4) Nasal endoscopy: see diagnostic nasal endoscopy.



Nasal endoscopy

(5) Orbital examination:
- Proptosis: protrusion of eyeball
    - Frontal swelling → Down and Lateral proptosis.
    - Ethmoidal swelling → Lateral proptosis.
    - Maxillary swelling → Upward proptosis.
- Vision: Acuity of vision + Field of vision.
- Mobility

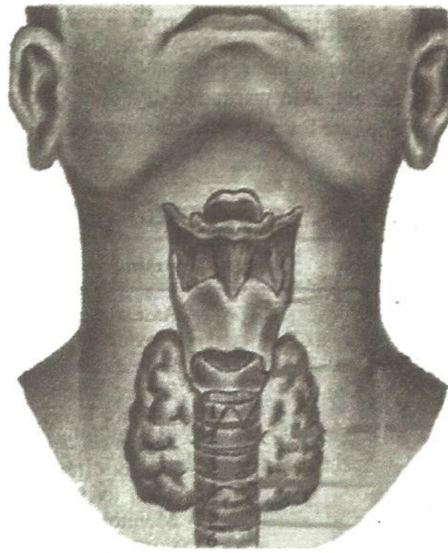
"الرب قادر نفوس يبيده كل مساكن عليا لايعاقب"
+

Throat

History taking

(1) Personal History: as before.
(2) Complaint: as before.
(3) Present History: Ask about

- O.C.D. of the complaint.
- Throat symptoms (pharynx + larynx).
- Other ENT symptoms: briefly.
- General symptoms.



Throat Symptoms: 10

1) Change of voice (Hoarseness)**:**
-Def.: Rough quality, low-pitched voice, due to one or more of 3 factors:
Impairment of vocal cord adduction.
Impairment of vocal cord tension.
Impairment of vocal cord vibration.

2) Difficulty of breathing (Stridor)**:**
-Def.: Difficulty noisy breathing, due to partial upper airway obstruction (larynx and/or trachea).

3) Difficulty of swallowing (Dysphagia)**:**
-Def.: Difficulty of swallowing.

N.B.:
- Hoarseness, Stridor and Dysphagia (medical terms)can be written in the present history as such.
- But in the Complaint:
  - Hoarseness= Change of voice.
  - Stridor = Difficulty of breathing.
  - Dysphagia = Difficulty of swallowing.

4) Chocking: may be present in:
- Vocal cord paralysis (10^{th}).
- Obstruction of salivary flow (Cancer hypopharynx).
- Loss of pharyngeal sensation (9^{th}).

5) Regurgitation: may be present in pharyngeal Pouch and Achalasia.

6) Pain: Site, severity, precipitating factors, relieving factors and radiation.
- Laryngeal pain → Referred to the ear through Arnold's branch of vagus nerve.
- Pharyngeal pain → referred to the ear through Jacobson's branch of Glossopharyngeal nerve.

7) Cough, expectoration and haemoptysis.

8) Neck swelling

9) Loss of Weight

10) Distant metastasis

N.B. Sites of distant metastasis are: LLBB (Lung, Liver, Bone and Brain).

(4) Past History: as before.
(5) Family History: as before

"لكن أحزاننا حملها وأوجاعنا تحملها"

+

Examination:

- General: as before

+

Comment on

Pallor: Present in anaemia as in Angiofibroma (due to epistaxis) and in Plummer-Vinson syndrome (post-cricoid Ca.)

Jaundice: Present in liver metastasis.

Cyanosis: Present in severe stridor.

- Local: **Pharynx and Larynx (throat)**

Other ENT organs: briefly.

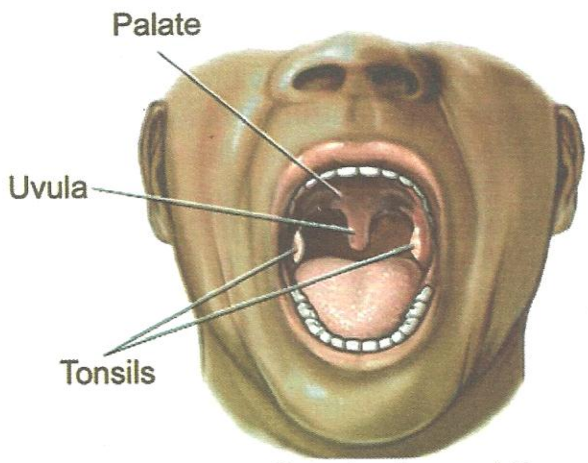
N.B. Neck examination should be done in every case.

Examination of The throat (the Pharynx and Larynx):

1) Oral cavity and oropharynx: Describe the abnormality.

By tongue depressor over the tongue and head light directed to the mouth while the patient saying ah. We can see the followings

- Gum and teeth.
- Oral mucosa and salivary ducts.
- Floor of mouth.
- Tongue.
- Palate.
- Oropharynx (Tonsils).



2) Hypophyarynx and Larynx:

1- External examination:

* Inspection: for Scar, fistula or sinuses, abnormal pigmentation, dilated veins and the movement of larynx up and down with deglutition.

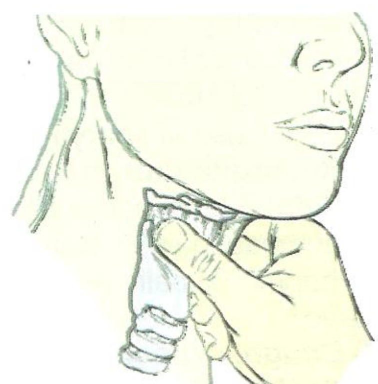
* Palpation: for

- Tenderness (Present in laryngeal perichondritis and trauma)
- Crepitus (Present in laryngeal trauma)

* Moure's sign: movement of the larynx over the vertebrae causing friction (click).

Absent click (in post-cricoid carcinoma)

Or Preserved click (no postcricoid carcinoma).



Moure's sign

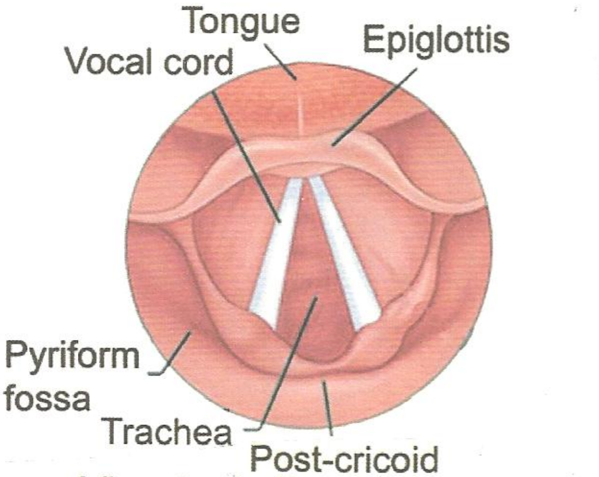
2- Indirect Laryngoscopy:

Done by laryngeal mirror, which is warmed before using to prevent condensation of vapour on it during respiration, it shows any pathology of the larynx and also vocal cord mobility on saying (E).

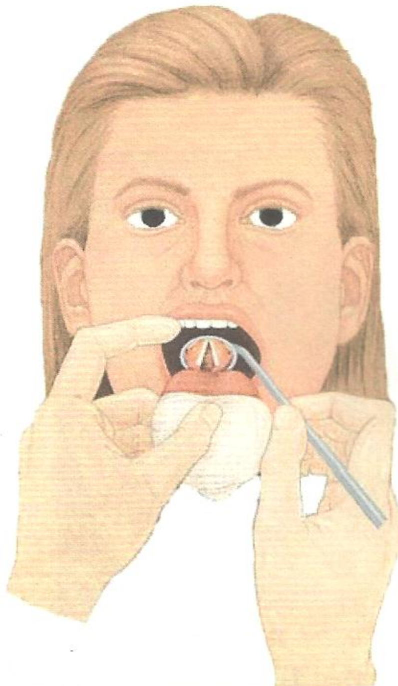
N.B.: If ↑ gag reflex → Xylocaine spray.



Indirect laryngoscopy mirror



View by indirect laryngoscopy


Indirect laryngoscopy

3- Flexible laryngoscopy.

3) Neck examination:

1- Thyroid gland:

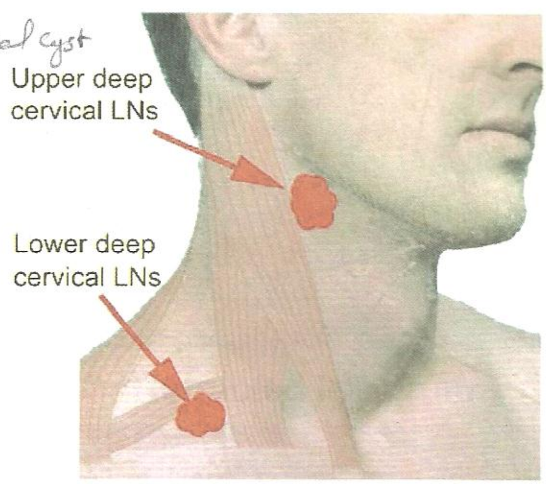
Swelling in the lower part of the front of the neck which moves up and down with deglutition and dose not move with protrusion of the tongue. ↳ if moved → thyroglossal cyst [Sistrunk's operation]

2- Lymph nodes:

Right or Left

Upper or lower deep cervical lymph nodes.

N.B.: Upper and lower deep cervical lymph nodes separated by superior belly of omohyoid. The most important group of upper deep cervical LNs is the jugulodiagastric present below and behind the angle of mandible (specific for tonsils).



3- Salivary glands.

4- Fistulae.

5- Swellings: Comment on 12 points.

- **S**ite: upper or lower/ Rt. or Lt.
- **S**ize: about ? X ?.
- **S**hape: rounded, oval ... etc.
- **S**urface: smooth or nodular.
- **S**urrounding structure.
- Overlying **S**kin.
- Tenderness.
- Border: well or ill defined.
- Mobility.
- Consistency: soft, firm or hard.
- Compressibility.
- Pulsations.

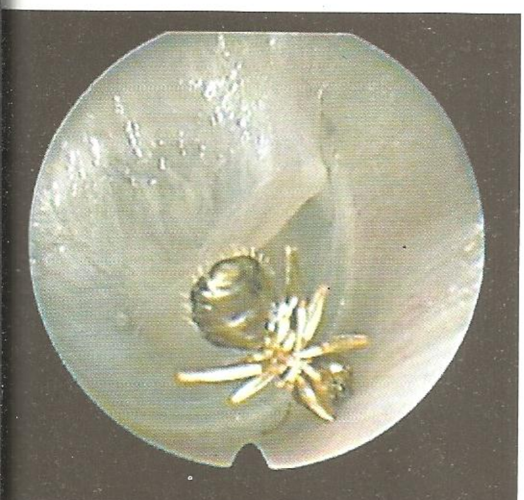
Clinical atlas



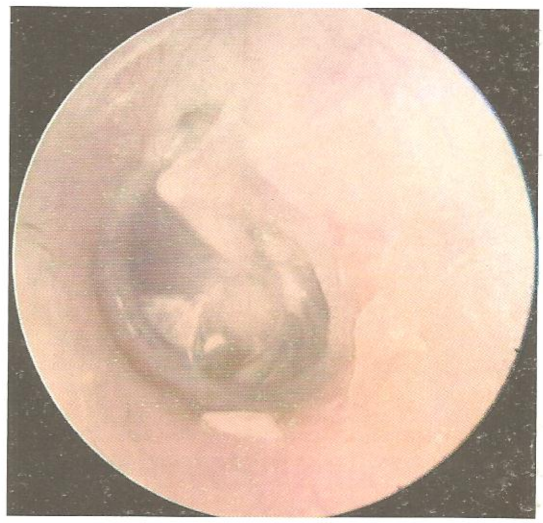
Normal right drum



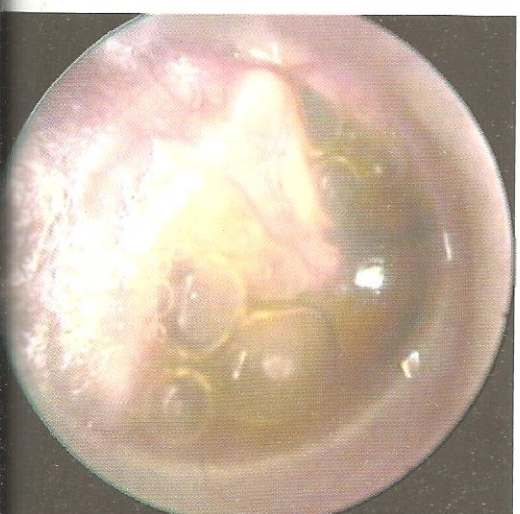
Normal left drum



Foreign body (insect) in the EAC



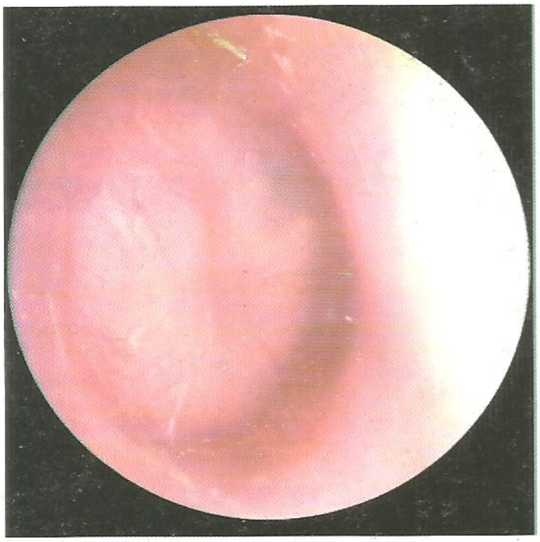
Retracted left drum



Secretory otitis media



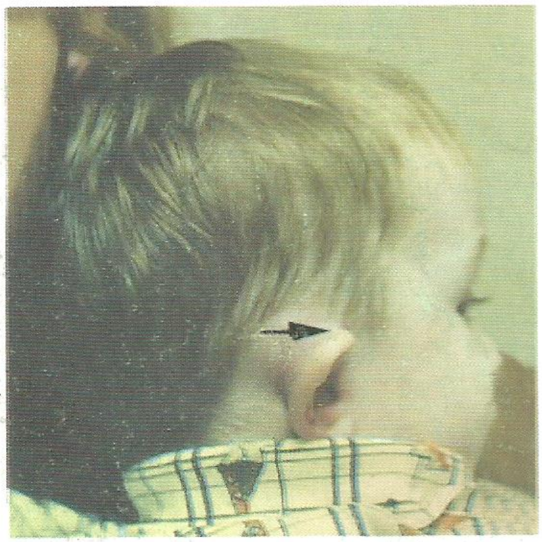
Adhesive otitis media



Acute otitis media



Bollous myringitis



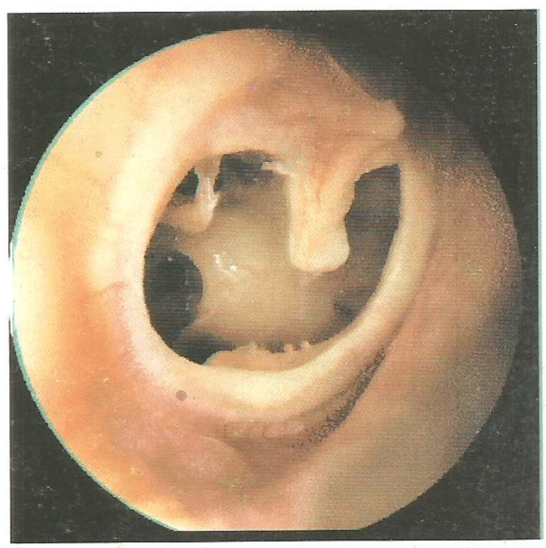
Acute mastoiditis



Small central perforation (dry mucosa)



Large central perforation (congested mucosa)



Subtotal perforation

N.B rarely seen total perforation



Posterior marginal perforation



Attic cholesteatoma



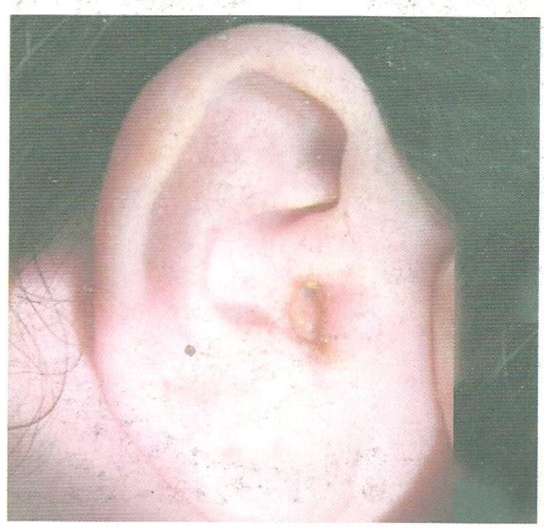
Marginal perforation with tympanosclerosis



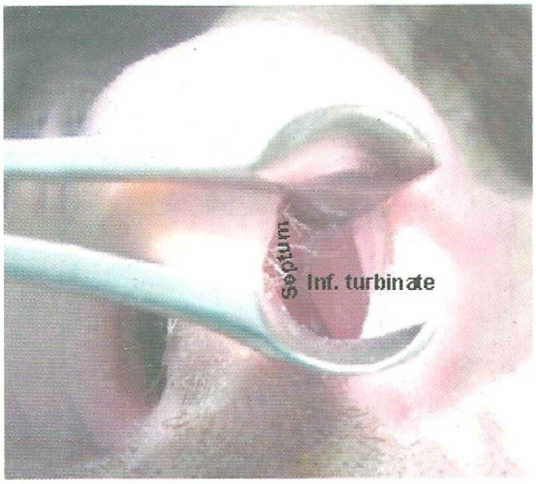
Traumatic rupture of the drum



Otomycosis

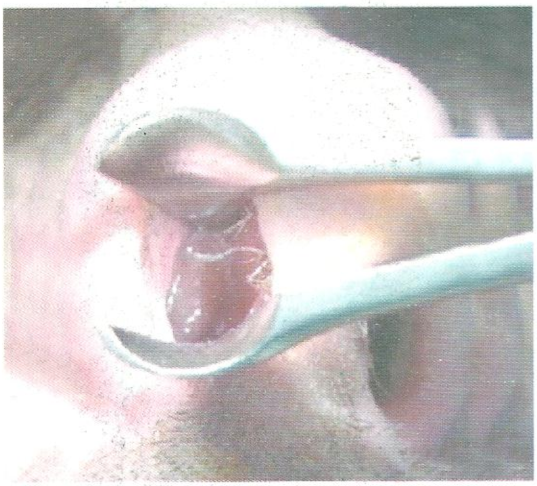


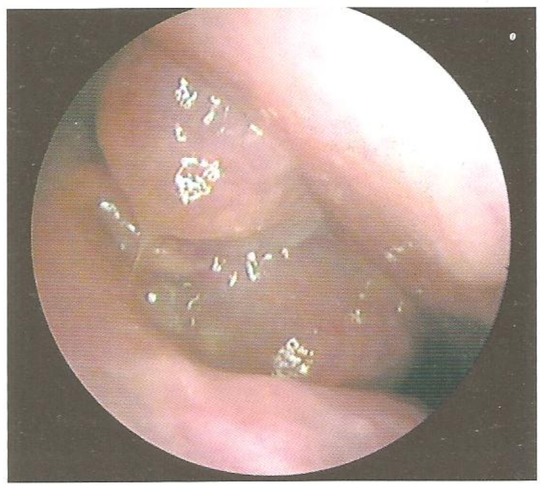
Otitis externa

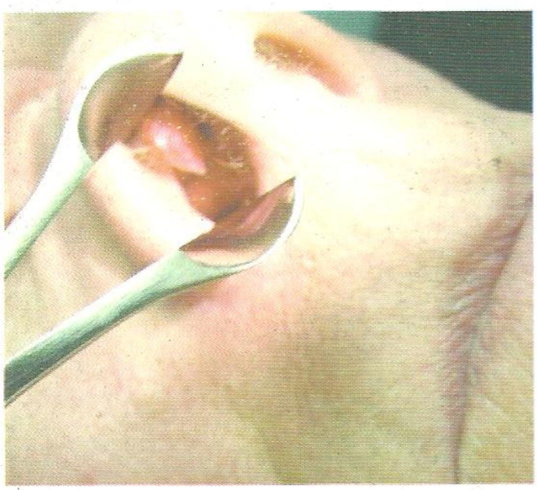


Anterior rhinoscopy (normal)

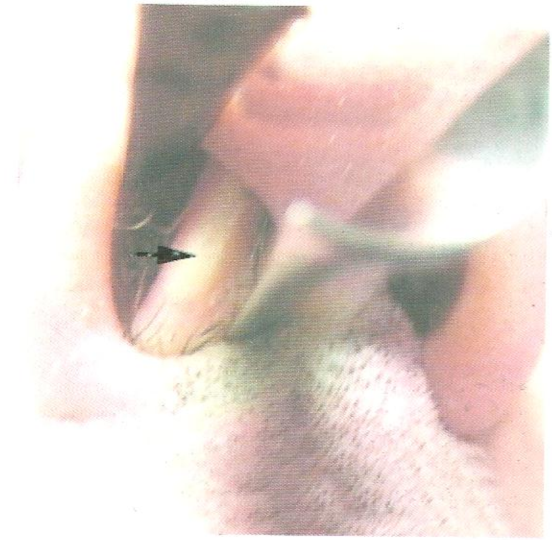

Nasal polypi seen by ant. rhinoscopy


Single nasal polyp seen by ant. rhinoscopy


Nasal polypi seen by endoscopy


Nasal papilloma


Septal haematoma



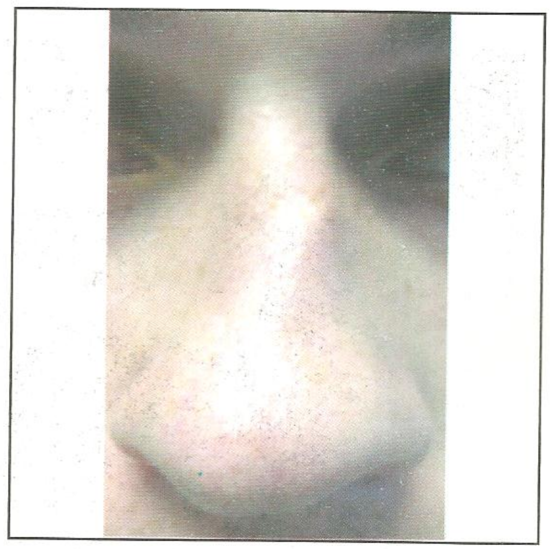
Devited septum to the right side



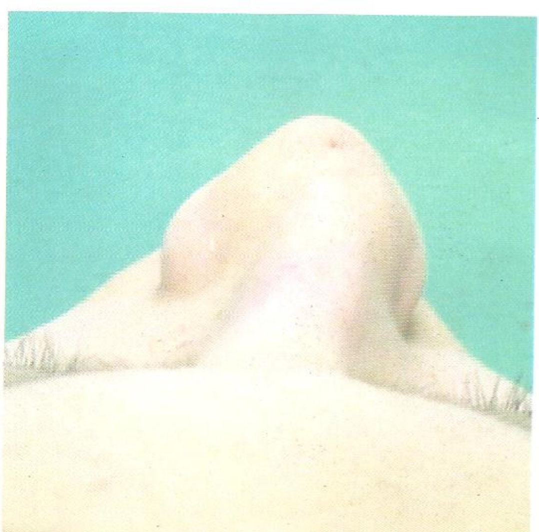
Dislocated (deviated) septum to the left side



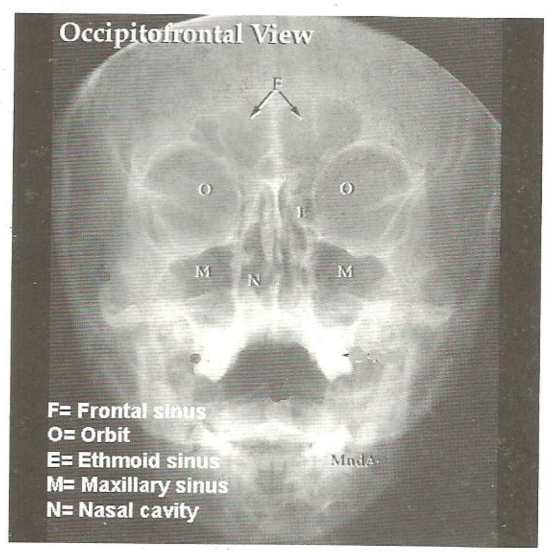
Dislocated septum to the right side



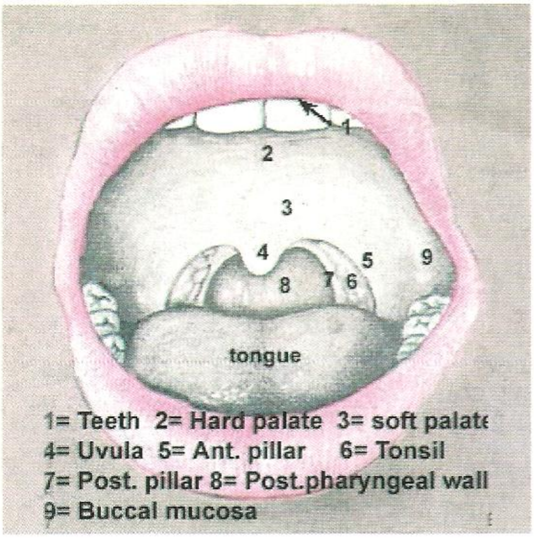
Fracture nasal bones



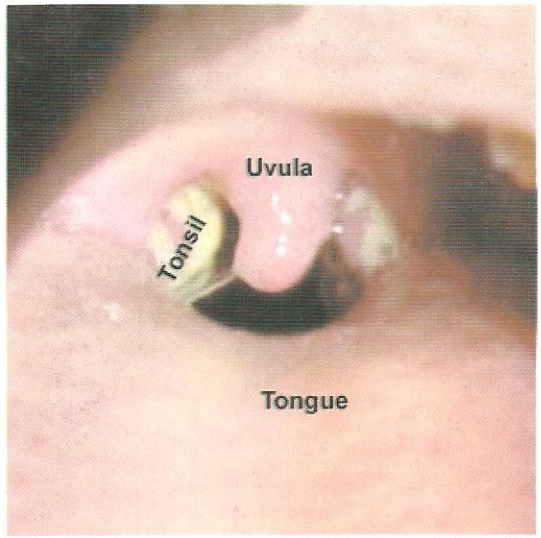
Fracture nasal bones



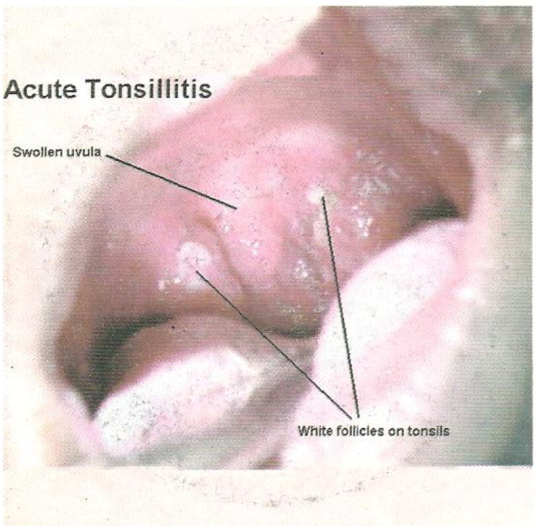
Normal X-ray (sinus view)



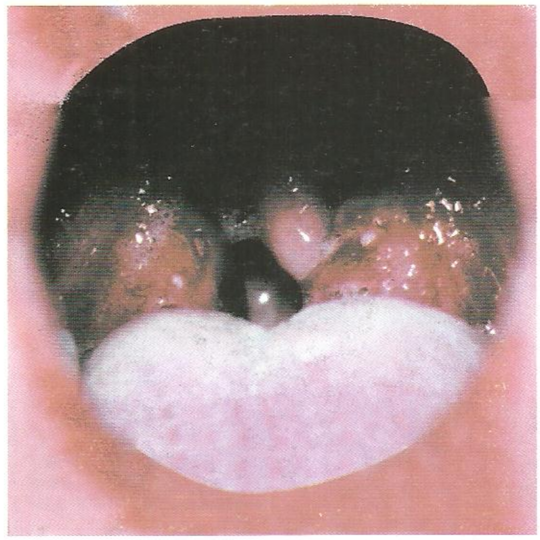
Normal Oral Cavity and oropharynx



Acute tonsillitis



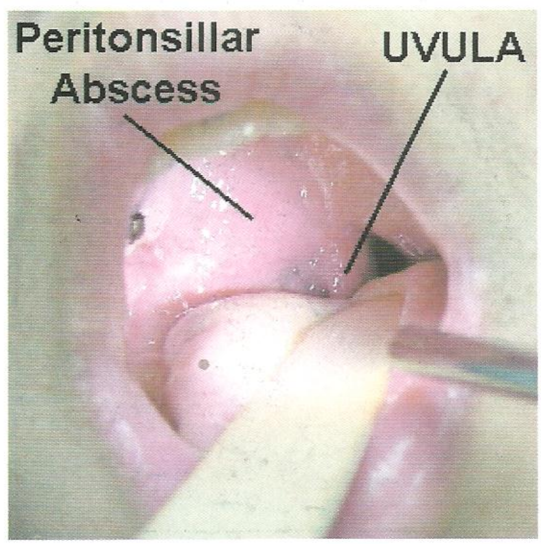
Acute tonsillitis (follicular)



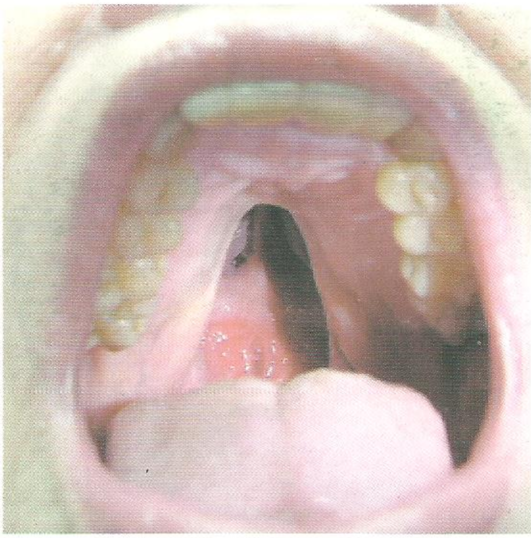
Acute tonsillitis (parenchymatous)



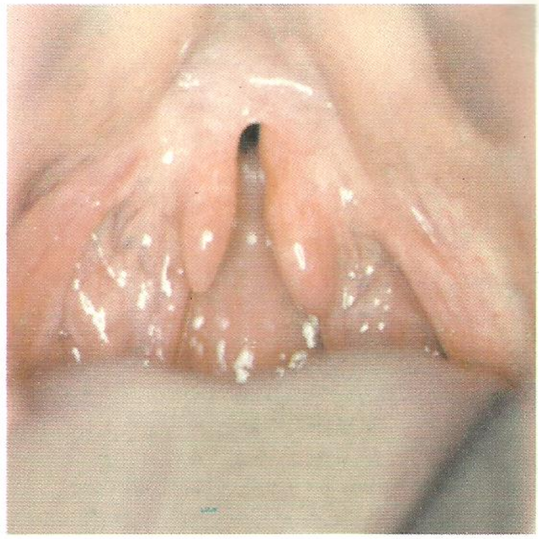
Chronic tonsillitis (kissing tonsils)



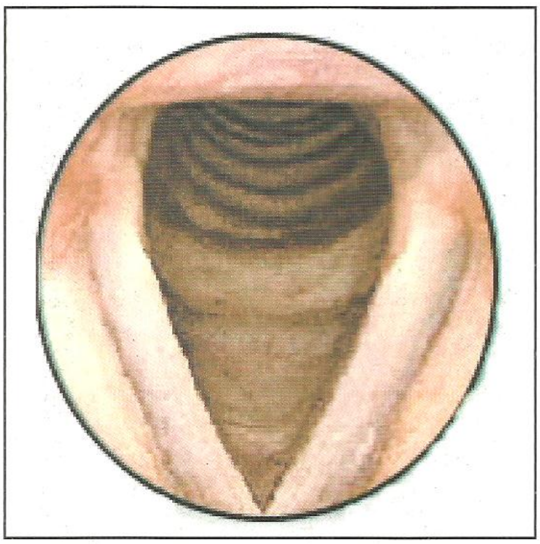
Quinsy (right side)



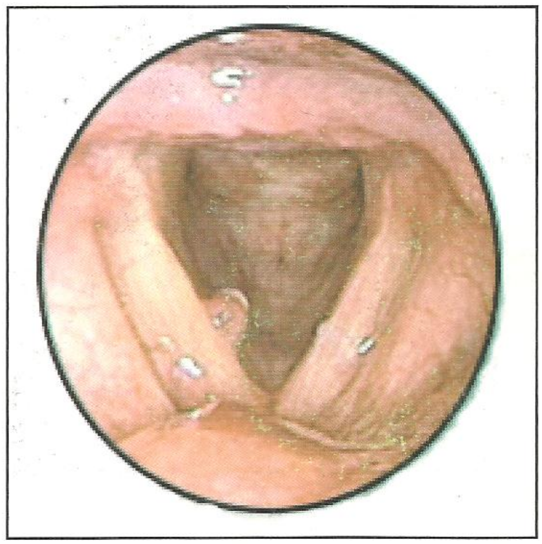
Cleft palate (soft)



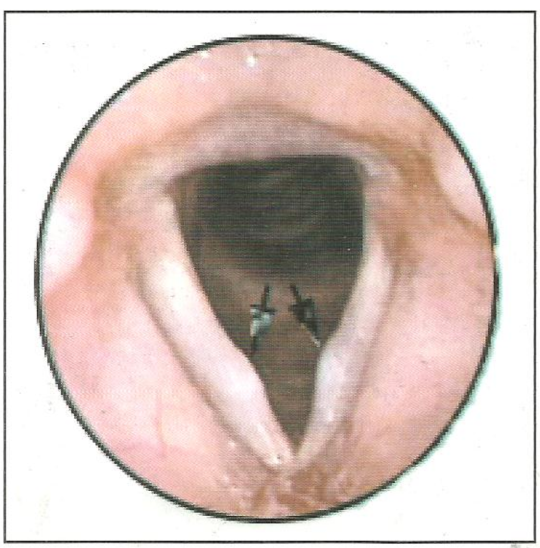
Cleft palate (soft)



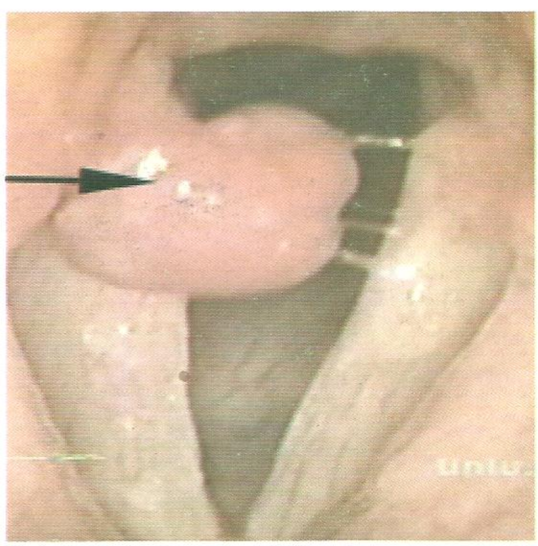
Normal larynx



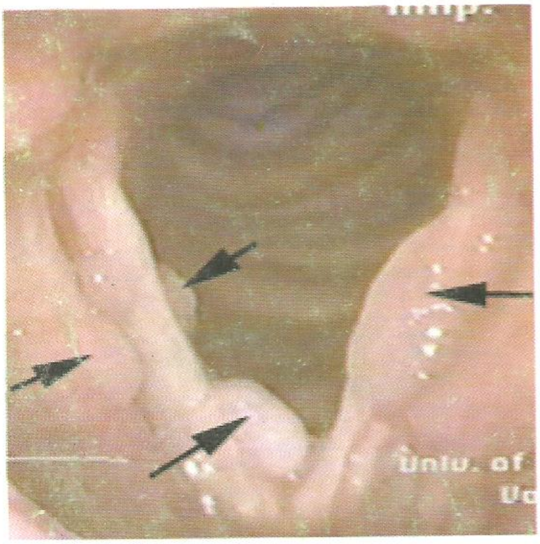
Vocal cord polyp



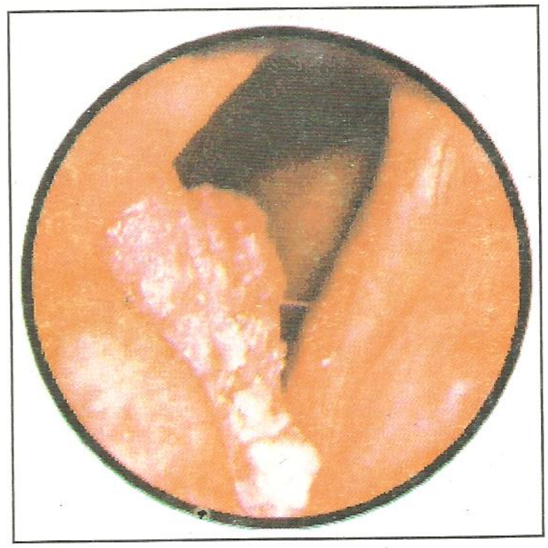
Singer's nodes



Single papilloma



Multiple papillomatosis



Glottic carcinoma



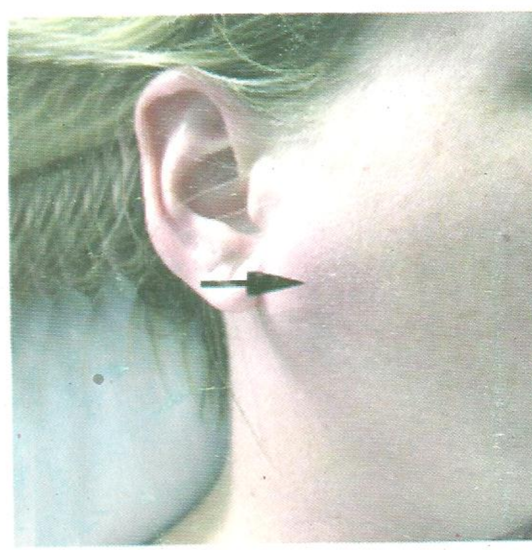
Thyroglossal cyst



Branchial cyst



Lymph node metastasis



Parotid swelling

رقم الايداع : ١٧٦٢٨ / ٢٠٠٦